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NOVEMBER 27, 1941

The IRON AGE

IN TWO SECTIONS—SECTION ONE

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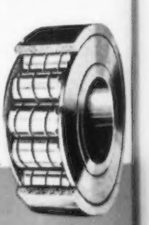

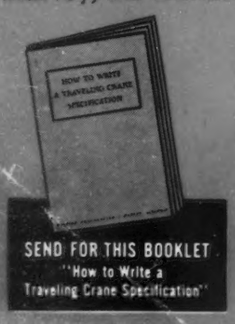

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WHITING *Quiet-Running* OVERHEAD TRAVELING CRANES

NOVEMBER 27, 1941
VOL. 148, NO. 22

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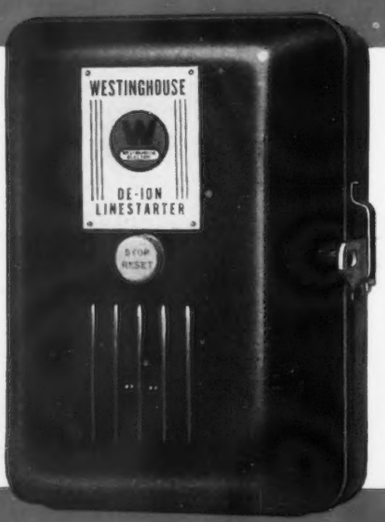

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Magnetic Across-the-line Starter
CLASS 11-200

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MOTORS AND CONTROL

THE IRON AGE

NOVEMBER 27, 1941

ESTABLISHED 1855

One Way Doors

IN a free country the citizens have freedom of action, limited only by the law, to follow their peaceful and legitimate pursuits, one of which is to earn a living. Another attribute of a free citizen is the right to change his mind. Take these rights away from a free people in normal times and freedom becomes slavery.

Under certain circumstances, of course, government has the right and the duty to restrict these freedoms. In times of national emergency, for example, the $21-a-month draftee cannot pack his belongings and leave camp because he is dissatisfied with wages, hours or working conditions. Nor can Mr. Grace of Bethlehem say "I don't think we will make any more armor plate or build any more ships," nor can Mr. Keller of Chrysler change his mind about making tanks.

Government alone, in a free country, has the right and government alone should have the power to put these one way doors on the national economy. Doors that open wide to let you in but that won't open to let you out.

Fuehrer Lewis, himself just one of 130 million other private citizens of this country, seeks to put a one way door on the coal industry and thus become its absolute dictator. Once inside that door, the coal miner must surrender his right as a free citizen to change his mind under penalty of being thrown out of the window and never being able to enter again.

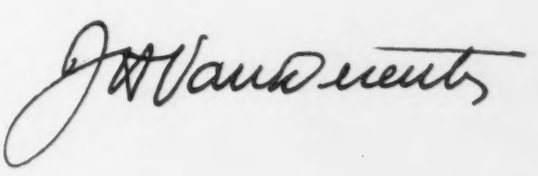
These one way doors to "closed shops" are portals to labor slavery. They compel customers (union dues payers) to keep on buying a product or service (union leadership) regardless of what happens to its quality. And if you want to know how union leadership can deteriorate in a closed shop industry, visit the federal penitentiaries and look up Scalise, Bioff and Browne.

A vital principle of progress, as well as a corner stone of liberty, is that any product or service must be sold on merit and not bought under compulsion.

It might be comfortable for THE IRON AGE if its present readers and advertisers were compelled to keep on buying it or go out of business. But we would hate to think of what might happen to the editorial quality under such conditions.

It would be nice if the present customers of a steel company were prohibited, for perpetuity, from buying steel elsewhere, regardless of whether that steel was good or bad. But it would be unfortunate for the customers and the general public.

Union membership that is bought by labor because it is sold to it through free acceptance of a superior service is one thing. But a one way door such as Fuehrer Lewis would hang on the portals of a great and vital industry is an anomaly in this 20th century.



Inland Helps Motorize America's New Army

Modern warfare calls for vast quantities of high powered motorized equipment. That is why factories throughout the land are working day and night to supply America's new army with trucks, trailers, scout cars, staff cars and other essential vehicles.

And for their construction Inland is rolling thousands of tons of steel products—sheets and strip for frames, bodies, fenders, wheels—plates for axle housings—bars for springs and bumpers. At a record pace Inland is producing these and other products so that the soldiers of the U. S. A. may have the fine motorized equipment they require and deserve.

Not only for army transport but for many other needs, Inland men and mills are all-out for National Defense. It is Inland's No. 1 Job!

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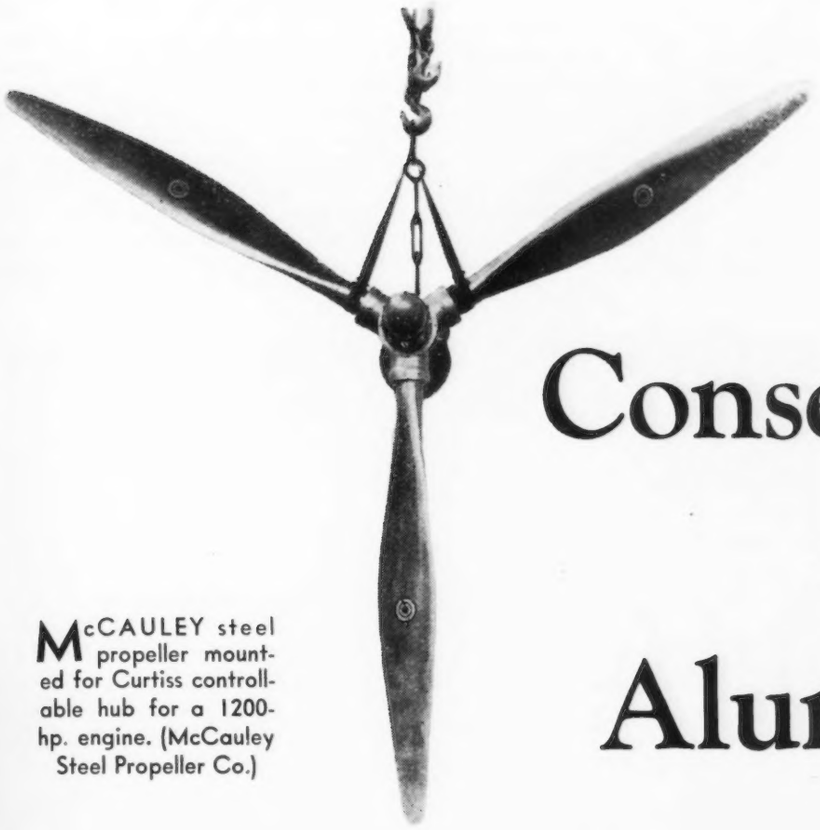


McCAULEY steel propeller mounted for Curtiss controllable hub for a 1200-hp. engine. (McCauley Steel Propeller Co.)

Conservation of Aluminum

° ° °

ALUMINUM ranks with the foremost materials for applications involving defense equipment. In fact, at the moment, it is placed second on the critical list, following magnesium. During the course of this year increasingly strict control of aluminum in various forms has been exercised by the OPM. As a consequence, its use for non-defense and unessential purposes has now been almost wholly, if not entirely, stopped. Under OPM regulations the distribution of aluminum in any form (ingot, scrap, semi-manufactured products, and finished goods) is now governed by priority control. At present most of the aluminum available is being allocated in effect, to the aircraft industry and its suppliers for the production of frames (with appurtenances) parts, and engines.

Output of military aircraft has expanded rapidly in the last year and the projected increase is so large that the demand for aluminum has threatened to exceed the supply. Likewise, the diversion of aluminum to aircraft and other direct applications for defense as well as to essential indirect uses under the priorities system has forced its total elimination for numerous civilian purposes. As a result, the country has been constrained to adopt a general program of conservation and substitution with respect to this metal.

Annual aluminum production today is at the rate of 325,000 net tons; importation from Canada runs in the neighborhood of 100,000 tons annually. . . . The nationwide aluminum scrap campaign last summer yielded about 5900 tons of metal scrap which in turn yielded approximately 3500 tons of secondary metal. . . . By the end of 1942, it is planned that aluminum production in this country will reach a pace of about 720,000 tons annually, at which time the government will own about 37 per cent of the capacity. . . . All of Europe in 1937 produced approximately 380,000 tons of aluminum.—ED.

Obviously, the available aluminum supply may be conserved for application to defense by three methods: First, by decreasing the output of non-defense products that require aluminum in their manufacture; second, by prohibiting its use for civilian or non-essential purposes, and third, by utilizing substitute materials. All three methods have been practiced this year. Thus, supplies to producers of consumers' goods, for example cooking utensil and radio manufacturers, have been withheld or much reduced under OPM orders. Accordingly, the output of numerous items containing or made of aluminum has been diminished in varying degree. Also, conservation measures involving the third method have been put into effect by the Army, Navy, and industrial consumers.

A problem of serious importance to many manufacturing companies has been the necessity of finding economic and technically suitable substitutes for aluminum without using other metals that also stand high on the critical list. The general difficulty of replacing aluminum by something else without increase of cost or impairment of efficiency is readily apparent since the accepted commercial applications of the metal have been developed over a period of years on

a competitive basis as against other materials. In some cases a solution has been arrived at by using certain plastics that have been advancing in favor rapidly for different purposes during late years. On the other hand, various specialty concerns unable to obtain aluminum have had to curtail or suspend production pending receipt of defense orders, mainly sub-contracts, for articles adaptable to their equipment. Others have been trying to convert their plants to new manufactures.

Under the exigencies of the defense situation, it has been necessary for industrial companies to adopt materials other than aluminum for many purposes in connection with war contracts, capital structures, and consumers' goods. Besides, numerous interesting substitutions for aluminum have been devised by the armed services in order to save this metal. Further investigations are being made by both these groups to determine how extensively various substitute materials may be utilized for standard applications. The magnitude of this task can be readily appreciated on recalling that the individual uses of aluminum, as developed up to now, approach 3000 in number.

Uses of Aluminum

In undertaking to conserve the supply of aluminum by reducing the consumption for non-essential purposes, thus increasing the quantity available for defense, it is first necessary to survey the whole field of use and ascertain the numerous applications of the metal. As is well known, aluminum and aluminum-base manufactures are produced in a profusion of compositions and forms. Thus, both the substantially pure metal and relatively impure aluminum are employed for many purposes. Also, aluminum is the main component of light aluminum alloys and is a minor constituent of various other alloys, both ferrous and non-ferrous. Aluminum and its light alloys are marketed as ingot, semi-finished manufactures in a wide range of forms and sizes, and a great diversity of finished goods. Products that consist wholly or in major part of aluminum are manufactured in large quantities, and the metal or its alloys may constitute a small percentage by weight of various structures or assemblies.

Under war economy, substantial and immediate savings of aluminum can be made by prohibiting the application of the metal for civilian goods that are normally produced in large quantities. Aluminum cooking utensils exemplify such use. Other important savings can be made by restricting the utilization of this metal for durable goods where it may be satisfactorily replaced by an established competitive material. The use of copper instead of aluminum for electric transmission cables may be cited as an example.

Turning now to a brief consideration of the main applications of aluminum, it may be remarked that in the five-year period 1935-1939, consumption in the United States was mostly distributed among the following: Cables for the transmission of electric current; cooking utensils; motor vehicles (passenger cars, buses, and trucks); aircraft (including engines and parts); general castings for numerous purposes; household appliances (vacuum cleaners, washing machines, and refrigerators); general stamping and fabricating for a miscellany of uses; metallurgy of steel, chiefly for deoxidation; machinery of numerous kinds; building construction; foil and collapsible tubes in packaging; chemical and food processing equipment; ship and boat building; bottle caps and closures; railroad and street railway cars; electrical manufactures; pigment for paint, and radio apparatus. Of the foregoing, the largest individual quantities of aluminum were used in the manufacture of cable and of cooking utensils.

In the period mentioned, other relatively important fields of consumption were: Cans, boxes, and similar articles; refrigerating and air conditioning; gages and meters; office and related light machinery; illumination (lighting fixtures and reflectors); furniture; telephone and telegraph apparatus; screws, rivets, and the like; photographic equipment, and a variety of technical instruments. Rather small to trivial quantities of aluminum have been used for numerous purposes including such diverse items as poultry leg-bands, lithographic plates, undertakers' supplies, hairpins, printing ink, fans, wiring devices, beauty-shop equipment, musical instruments, toys, artificial limbs, and buttons. The total amount consumed annually for minor applications has, however, been surprisingly large.

Strangely enough, the number of separate uses of aluminum in military equipment is rather small although the total amount of metal that may be employed for direct defense purposes by the United States in the present emergency will likely be enormous. The great

Pyrex glassware saucepans. (Corning Glass Works.)

bulk of this is to be utilized in the production of warplanes. Apart from aircraft, the principal military applications of aluminum are for the following: Naval construction; parts of trucks, tanks, and ammunition carts; bomb and shell-fuse parts; flares; field mess kits and field ranges; pontoon bridges; gas masks; and some signal apparatus. Aluminum is important in the construction of warships, being used for bulkheads, doors, galley equipment, and miscellaneous fittings. The primary object in employing aluminum here is to diminish weight. Equipment carried by the individual soldier should be made of aluminum or other light material wherever such application is practical. This also applies as to portable articles and mobile equipment in general. Obviously, the reduction of dead weight is very helpful in accelerating the movement of men, guns, and supplies in combat on land or sea as well as in the air.

After surveying the numerous uses of aluminum it is feasible to determine which ones are to be regarded as non-essential and which are necessary for direct or indirect purposes of defense. The relative importance of the various military applications is a matter of considerable controversy. At any rate, much aluminum has been made available for American defense by OPM control which prohibits its unessential use.

Substitute Materials

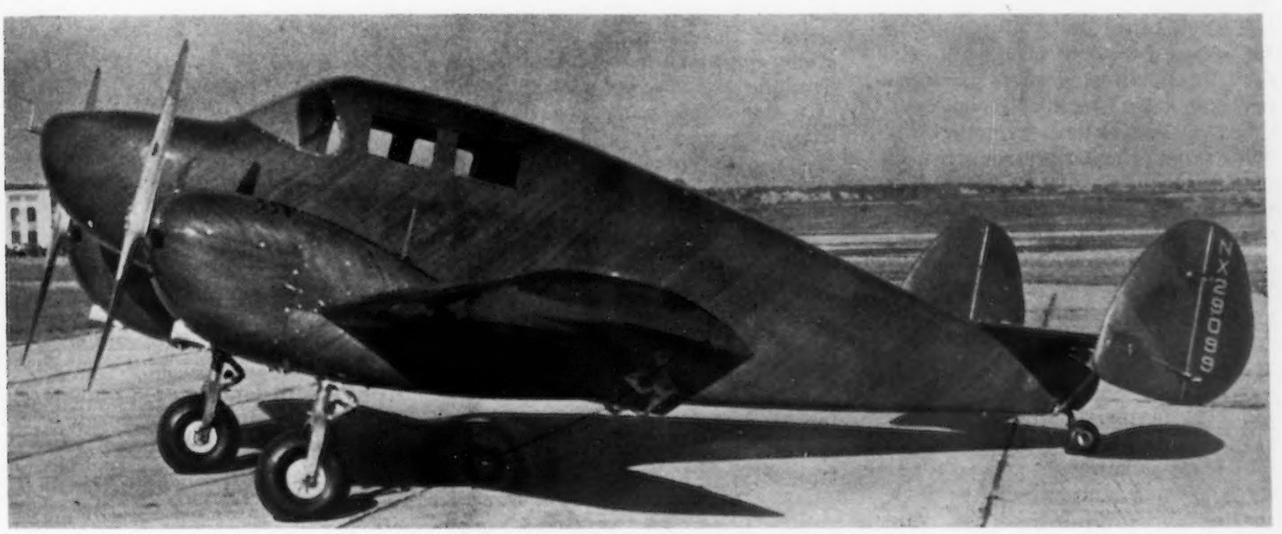
Materials that may be used instead of aluminum for diverse purposes are rather numerous. However, in undertaking to adopt a particular substitute it is necessary to consider several factors including its availability and cost as well as the nature of the intended application. Of course, under free economy the commercial utilization of materials is mainly conditioned by the circumstances of competition. Most frequently, therefore, the cost/utility ratio is of foremost importance. On the other hand, under war economy all requirements for direct and indirect defense must take precedence over civilian needs. Accordingly, the quantities of supplies have to be governed by rationing and allocations. Such controls force the uneconomic use of various materials for many commercial applications.

As a first approach to the problem of finding reasonably good, if not wholly satisfactory, alternates for aluminum, it is of interest to note that with advances made over a period of years this metal itself has become a substitute material of wide adaptability. Some typical examples of practice serve to reflect the position. The aluminum-base products listed in the following paragraph have been developed for use in place of the same ones manufactured of the materials given in parentheses:

Paint (lead and zinc compounds); electrical conductors (copper); structural shapes (steel and wood); foil and collapsible tubes (lead and tin); building material (cement, stone, wood, and steel); ink (carbon black and colors); motor pistons (cast iron); piping (brass); insulation (asbestos and magnesia); furniture (steel and wood); cooking utensils (cast iron, enameled steel and glass); artistic wares (copper and pewter); light reflectors (silver plating); wrapping material (paper); and aircraft members (wood). Many more instances might be cited.

Depending upon the application, either metals or non-metals may be used as substitutes for aluminum. In the metal group are included iron and ferrous alloys, together with non-ferrous metals and alloys. In the non-metallic group are embraced a variety of materials that may be natural, processed, or synthetic.

The usual base metals and alloys thereof are adaptable as alternates for use in place of aluminum or its alloys. Whether cast or wrought products are to be employed is necessarily governed by the particular application. In the ferrous class, plain carbon and alloy steels, cast iron of various compositions and malleable iron are to be considered. In the non-ferrous class feasible substitutes may be found among copper, lead, magnesium, nickel, tin and zinc as well as alloys rich in these metals. The specific compositions of ferrous and non-ferrous alloys that may be utilized instead of aluminum-base materials need not be examined in detail here but require consideration together with careful scrutiny of mechanical



NEW airplane built of molded plastic plywood. (Langley Aviation Corp.)

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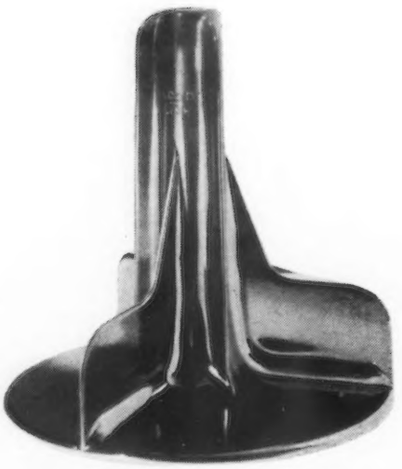
properties and other qualities in order to choose suitable substitutes.

Numerous non-metallic materials may be utilized in place of aluminum for one purpose or another. Most of these have been in common use for long periods of time and so far have been supplanted by aluminum to relatively small degree. Among them may be mentioned wood, concrete, minerals or rocks, ceramic wares, some inorganic chemical compounds, textiles, various plastics, rubber and paper. Likewise, certain composite products are adaptable as substitutes for aluminum, for example laminated wood and steel coated with porcelain enamel. Rapid advances have been made in late years by glass for structural purposes and by plastics for use instead of metals or alloys in many applications. New developments in laminations, so called, that is layers of wood or paper bonded with plastic substances, are of increasing interest since these products are satisfactory substitutes for sheet metals in different kinds of structural assemblies.

The substitution of aluminum or its alloys by some other material may often involve merely simple replacement. Frequently, however, more or less extensive changes in the design of parts, structures, or machines are necessary when such substitution is to be made. Furthermore, in most cases alterations in manufacturing processes, retooling, or other departures from established procedures are normally required. From the viewpoint of conservation for defense it is inadvisable to substitute for aluminum a material which likewise stands high on the critical list or which may shortly become critical. Rather, the attempt should be made to find something which is available in plentiful supply. Of course, this has become increasingly difficult, if not impossible in many instances, in the course of recent months.

Specific Substitutions

In considering the problem of suitable alternates for aluminum and feasible substitutions in practice, it is to be remarked that there are sound utilitarian reasons for the use of this metal in all, or almost all, commercial applications. As a rule, the adoption of a substitute may be expected to result in higher cost, decreased efficiency, inferior characteristics, or some other disadvantage. Hence, each separate case of proposed substitution will ordinarily require careful selection of material in order to obtain the best, or at least an acceptable, compromise.



PLASTIC agitator for a washing machine. (Nineteen Hundred Corp.)

The substitutions recently made for aluminum by industrial consumers and the armed services are so numerous that the confines of space preclude giving a detailed list here. (Furthermore, numerous possibilities are under investigation.) Suffice it to say, however, that most of the changes in practice have been effected in the fields of non-essential articles and civilian goods. At the same time, the consumption of aluminum for some strictly essential purposes has been diminished, for example as a deoxidizer in the production of steel. Important uses that have been almost wholly eliminated or else substantially reduced are for cooking utensils, electric transmission lines, passenger motor cars, building construction, household appliances of various kinds, business machines, packaging, and radio sets.

Ferrous alloys are being used in place of aluminum for a variety of purposes. Malleable iron is a suitable substitute for cast aluminum alloys in many applications but has the disadvantage of increased weight. In the automotive field cast iron is replacing aluminum alloys for pistons, cylinder heads, and other parts of passenger car motors. Steel sheet is widely applicable as an alternate for aluminum and its alloys in general forming and stamping. Owing to its relatively high content of chromium and nickel, stainless steel (18-8) is a critical material but as such ranks lower than aluminum on the OPM list. Notable advances are being made in the use of stainless steel for aircraft construction.* For example, the new Fleetwings BT-12 basic trainer is built largely of this alloy. Also, steel propellers for airplanes are finding increased application. If high-strength alloy steels were utilized more extensively for aircraft, less aluminum would be needed in that field and a larger supply of the latter metal could be made available for other important defense purposes. Plain, tinned, and porcelain enameled steel, cast iron, and glass are the accepted materials for use in replacement of aluminum for cooking utensils.

* *Within a year Edward G. Budd Mfg. Co., William B. Stout and others hope to be making very large cargo aircraft entirely of stainless. See THE IRON AGE, Oct. 30, p. 62, Nov. 6, p. 93.—ED.*

Substitutions for aluminum by other non-ferrous base metals have not been so numerous as by the ferrous materials since supplies of copper, lead, magnesium, nickel, and zinc are all below anticipated requirements. As a matter of fact, much work has been done by both industrial consumers and the armed services to develop suitable substitutes for the several non-ferrous metals. The bulk of replacement has been made by ferrous alloys and non-metallic substances. As a result of increased demand for these, shortages have already appeared in some lines, including foundry iron and plastics. Lead had been in fairly ample supply until recently. Accordingly, lead-base paints were being used in place of aluminum paint and lead foil as a substitute for aluminum foil. However, lead has now been placed under full priority control and alternates for it are being sought. Clearly enough, the business of forcing demand from aluminum to some other material may soon cause a shortage of the latter.

Passing now to the application of non-metallic substances in place of aluminum, it may be noted that plastics have been employed rather widely for numerous purposes. Thus, plastics are being utilized as substitutes for aluminum in parts of household equipment, including washing machines, vacuum cleaners, refrigerators, and utensils. Plastics are likewise used for bottle caps, food service trays, handles and knobs of many kinds, phonograph-tone arms, a variety of housings,

lighting reflectors, and parts of fruit-juice extractors, scientific instruments, air conditioning equipment, and business machines. Plastic airplane parts have been adopted, and entire planes (fuselage, wings and controls) have recently been built of laminated wood, bonded with plastic material.

Glass has appreciable possibilities as a substitute for aluminum, for example in sundry household appliances including cooking utensils, refrigerators, and stoves. Probably the best known applications of glass in place of aluminum are for cooking utensils and as a structural material in building. Paper and cellophane are used instead of aluminum foil for packaging food. Wood is replacing both steel and aluminum for office furniture.

Economic Effects

As the result of forced or voluntary conservation measures in respect of aluminum sundry serious effects have appeared in the national economy. These include the shutdown or curtailment of plant operations, loss of wages and migration of labor, decrease of gross business by local merchants, temporary, and perhaps, permanent loss of markets for various aluminum products, reduced output of civilian goods, and other dislocations. At the same time the diversion of aluminum to defense purposes has hastened the building of large new aircraft plants, driven many companies into unfamiliar branches of manufacture, and spurred investigation in search for substitute materials. In addition, lack of aluminum has impelled managements to study the possibilities of making new products from materials that are likely to continue in large supply and free from restrictions.

The impact of the defense program as concerns aluminum has been disastrous in the case of relatively small firms in the cooking utensil and household utility industries. This also applies in general to small aluminum fabricating companies. Large manufacturers of civilian goods, including makers of refrigerators and some other durable or semi-durable products, have been able to develop substitutes for both aluminum and other non-ferrous metals. As is known, many little companies in the metal stamping and fabricating field need to get defense orders at the earliest possible date in order to survive and provide employment in communities. This is true especially as to manufacturers of parts for household appliances, radios, and motor vehicles as well as to small stamping and other shops that are equipped to work various metals.

Numerous substitutions for aluminum, by both metals and non-metallic substances, are doubtless of a temporary nature, that is for the duration of the emergency. Allowing for inertia in making the change back again, the common outlets for aluminum will likely be regained in due course after the metal is once more available in ample supply for non-defense uses.

Note may be made by the way that specifications for various aluminum-base products have been relaxed by different consumers including the armed services so as to permit the use of secondary metal where it was formerly excluded in favor of primary aluminum. In this connection emphasis is placed upon mechanical or physical properties and performance in application rather than chemical composition. Moreover, rather low grades of secondary aluminum are being admitted for some purposes.

As related to the matter of research in developing suitable substitutes for aluminum, it may be remarked that advantage is being taken of the present opportunity by producers of non-metallic substitutes, processed materials and synthetics generally to explore the possibilities with the view to expanding their markets. Numerous ingenious applications in the substitutional field have been brought forth and more are to be expected as the emergency continues. The stimulation of research is at least one worth while by-product of the war.

HOUSEHOLD refrigerator in which several aluminum parts have been replaced by porcelain enameled steel. (General Electric Co.)

Supplies Set Record

During the last year, much has been heard about shortages of aluminum and other materials, although in practically all cases the outputs or supplies are the largest on record. Deficiencies in quantities for all purposes have been ascribed in part to erroneous estimates of total requirements and in part to unexpected increases for military needs. An explanation of inadequate supplies in the case of aluminum or any other metal is not hard to find. If all, or nearly all, aluminum available is set aside for the construction of aircraft, and still more is wanted for that purpose, there is scarcely going to be any left for any other use. Obviously, the solution to the general problem of so-called shortages is to be had by properly allocating supplies, increasing output and imports, utilizing suitable substitutes for both aircraft and other applications, and reducing the consumption for non-essential goods.

Measuring the

Fluidity of Cast Steel

Cast steel fluidity test piece.

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. . . A simple, quick, yet adequately sensitive, technique for measuring fluidity is described herein. Molds for use with both lip and bottom pour ladles are discussed and the effect of sand, pouring heights and other test variables are noted.

EFFORTS to obtain the best possible steel casting require not only that composition be held to rigid specifications, but also that fluidity (variously termed castability, life, fluid life, runability or shankability) must be such that the molds will be readily and satisfactorily filled.

Porous and incompletely run castings, lapped surfaces and unfaithful mold reproduction can often be laid directly to the sluggishness of the steel used for pouring. Badly skulled ladles are not an uncommon problem, and it has been suggested from time to time that the efficiency of risers, center line weakness, resistance to hot tearing and similar characteristics may be influenced by the fluidity of the casting metal.

With this in mind, the Naval Research Laboratory here undertook to develop a mold and technique suitable for measuring the flowing quality of steel in the furnace in order to determine the proper tapping time. The laboratory also sought to develop a modification of this test to enable foundrymen to determine the fluidity of the steel in the ladle at any particular time.

What was sought in this investigation was a test piece which should be capable of measuring accurately small variations in fluidity and yet faithfully evaluating maximum and minimum values which result from extreme conditions of temperature and composition. Too, the test mold should be simple, inexpensive to make and convenient to prepare, easy to manipulate and to read directly. Accurate leveling should not be necessary and provision should be made for maintenance of a constant flow head or at least one which varied within narrow limits. Finally, results from the test piece should be reproducible.

The spiral type of test piece for measuring the fluidity of cast metals was proposed as early as 1919, but it remained for Saeger and Krynitsky of the National Bureau of Standards, to adapt it for use with cast iron and non-ferrous metals. The work was published in 1936 and later this test became an A.S.T.M. standard for measuring the fluidity of these metals.

Previous Experiments

Several attempts have been recorded where a spiral flow channel has been tried with cast steel but little success was reported. Some time prior to 1936, Ruff found the spiral not fully satisfactory and concluded that dynamic laws applied more directly when straight flow channels were employed. Accordingly, he developed a test for use in measuring the fluidity of

cast steel which involved a straight cylindrical flow channel of 3/16-in. diameter fed through a simple conical runner. In all tests discussed, the flow channel was made in sand molds of either the green or air dried type. The straight flow channel has been used extensively in England for both research and plant testing and to some extent in America. Opinion varies widely on the effectiveness of this method of testing for routine foundry practice.

Kron and Lorig, working at Battelle Memorial Institute, published the results of work on the subject in 1940. They used straight flow channels, 7/32-in. diameter, and their mold was an improvement over that of Ruff because of the inclusion in the design of a carefully controlled ferrostatic head which governed the entry of metal into the flow channel.

From a careful study of the results obtained by the various investigators using the straight flow channel, it was apparent that this type offered little promise as a foundry tool. Test values were not dependable and lengths of flow were very short. However, several tests were made at the Naval Research Laboratory before this type was discarded in favor of the spiral type.

The results of preliminary tests at the laboratory indicated that the Ruff mold, unless provided with means for controlling the ferrostatic head and regulating the flow of metal, did not give consistently reproducible results and experimental points were badly scattered. The tests also showed that the 3/16-in. diameter flow channel failed to give significant lengths of flow in steels which were still fluid enough to fill a mold. The maximum lengths of flow for steel of average analysis at normal pouring temperature were never greater than 12 inches. It was impossible, in this size channel, to accurately measure small variations in fluidity.

It was also found that the mold employing a straight flow channel required careful leveling before pouring.

Because of the success reported when Saeger and Krynitsky used the spiral mold for measuring the fluidity of cast iron, this type offered more promise as a test for cast steel. Accordingly, this type was next tried, and after the modifications necessary to adapt it to steel, a satisfactory test was developed. The details of the final design are given in Fig. 1, and steps in preparing a test mold are shown in Fig. 2. Fig. 3 shows the arrangement of a test mold.

In order to standardize the method, however, it was necessary to determine the influence of variables, in particular to determine the effect of sand grain size, of green, dry, and cement sand, pouring height, and in the case of tests at the arc furnace, to determine the effect of time of holding the sample in the spoon before pouring and to determine the amount of aluminum to be added to the spoon sample. The results of such tests as were found necessary to evaluate these variables are summarized below.

Summary of Investigations

Nearly all of the development work was done using a 300-lb. induction furnace, as melting and sampling were greatly simplified and results were fully as applicable as though all tests had been made on spoon samples taken from the arc furnace. From the results of this work the following conclusions may be drawn:

(a) The spiral test piece, as finally adopted, is satisfactory for evaluating the fluidity of cast steel. Results are reproducible, and the mold is simple and convenient to prepare. Reference marks on the cope surface of the casting make it read directly.

(b) Variations in sand grain size from A.F.A. fineness number 53 to 123 showed no selective influence on casting length. Molds made from bentonite bonded green and dried sand, and cement sand, when poured under identical conditions, gave equal spiral lengths. Thus the test is not sensitive to any normal differences in the various molding practices and results from all foundries would be comparable.

(c) Within reasonable limits (variations from 2 to 10 in. above the pouring basin) pouring height did not affect the reproducibility of the test.

(d) Varying the amount of aluminum added to 10-lb. spoon samples taken from the arc furnace indicated that 0.4 oz. (strip 3/16 in. × 1/16 in. × 12 in. long) was the proper amount for average heats of plain carbon (0.15 to 0.30 per cent C) steel in the unkilled condition.

(e) In testing at the arc fur-

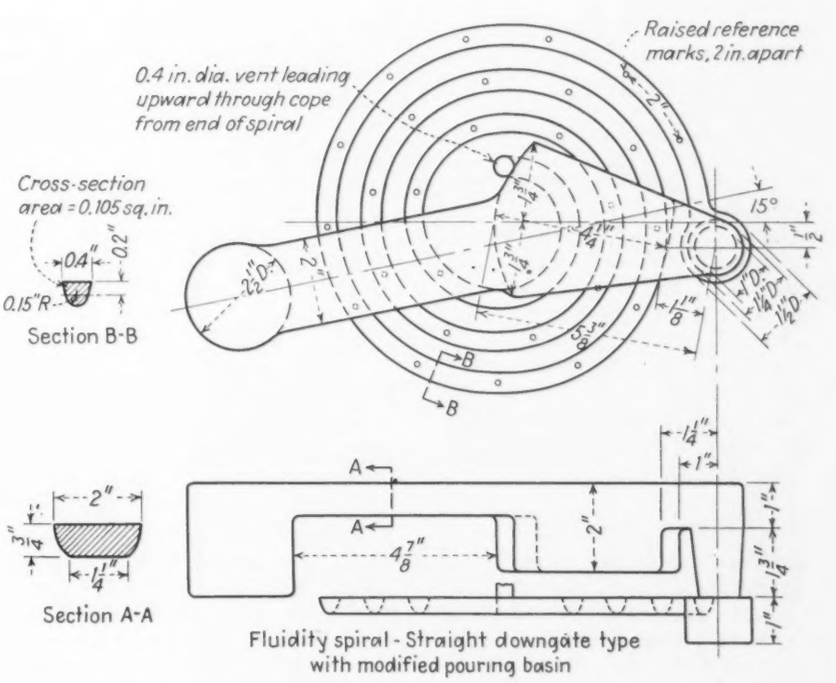


FIG. 1—Construction details of a spiral fluidity test pattern found most satisfactory for half-ton or smaller ladles.

nace the time normally required to pour the fluidity test casting from the instant of dipping is about 4 sec. To determine what variation might exist as the speed of the operator varied from plant to plant, tests were made which proved that it was possible to hold the metal in a well slagged spoon as long as 15 sec. without invalidating the results of the test.

(f) Composition has a marked influence on fluidity, the magnitude varying with the nature and amount of the alloying element. The state of oxidation of the bath is a major factor governing fluidity. Results indicated that a critical amount of deoxidation was essential to maximum flow. Variations above or below this value resulted in shorter spiral lengths for any given temperature.

(g) The temperature of the steel was found to have a predominant influence on casting length. The relationship for ordinary analyses is not a linear function as the temperature increases from 2732 deg. F. to 3092 deg. F. to 1700 deg. C. The increase in test casting lengths resulting from an increment of temperature change decreases at the higher temperatures.

Preparing Test Molds

Ordinary molding technique is used in preparing the molds and the molds may be either green or dried sand. If dry or cement sand is employed, it is necessary to dry the molds assembled to prevent fins which would otherwise lead to poor results. In making tests with this mold (shown in Fig. 2), the steel is poured into the runner guide, builds up to the lower overflow level, runs into a pouring button and hence into the spiral. A second overflow trough, ¼ in. higher than the first, empties into a catch basin. This arrangement prevents the ferrostatic head from changing more than about ¼ in. and provides a smooth flow of metal into the spiral. A completely filled casting weighs 12 lb. when the overflow basin is filled. The usual test weight, however, is 8 lb. as it is not desirable to completely fill the overflow.

The testing technique finally adopted as standard practice for use with the laboratory one-half ton, three-phase arc furnace has proved very satisfactory. The mold is placed in position near the furnace door. The sampling spoon holds about 10 lb. of steel and is welded to a ¾-in. diameter rod 8 ft. long. A coil of aluminum 3/16 in. x 1/16 in. x 12 in. long wound on the end of a small rod is also required. These are all the essential requirements for the test.

Whenever a test is desired, the operator warms the spoon and slags it carefully. The sample is taken at a point as near the center of the bath as possible and is quickly drawn from the furnace. As the spoon crosses the door sill, a second operator vigorously stirs in the small spiral of aluminum for deoxidization. He does this while the man handling the spoon is moving it into pouring position and does not interfere with the test. The spoon is then dumped without loss of time into the runner guide. It has not been found necessary to slag the sample in the spoon but this may be done if desired.

The spiral immediately solidifies and can be shaken out of the mold and its length observed. The reference marks on the cope surface of the spiral are 2 in. apart and facilitate reading the length of flow which is taken as the index of fluidity. The aluminum only needs to be used for tests prior to final addition or when necessary to insure a killed sample, but as long as a standard practice is observed it will be satisfactory to use it at all times.

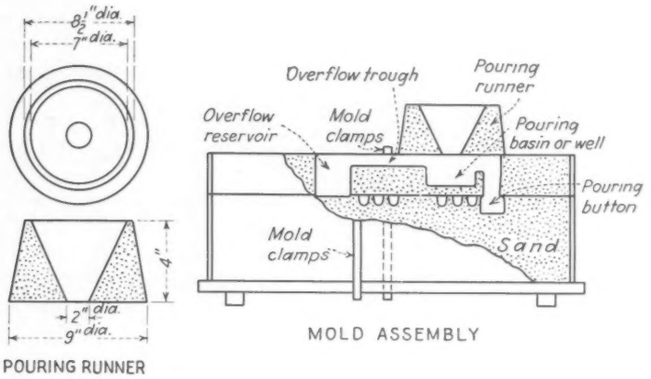


FIG. 3—Mold assembly of spiral test pattern shown in Fig. 1, and details of pouring runner.

Tests Prove Advantageous

From routine use of this test on all heats made in the laboratory arc furnace, definite advantages in better steel and cleaner ladles have resulted. Not only has it been possible to follow the progress of the heat to determine the proper tapping time, but it has been possible to determine the effects of changes in slag or charging practice, alloying elements, and type, amount, time, and order of adding deoxidizers. Rapid changes in fluidity as a result of suddenly increased or decreased power input can be readily detected.

For example, one test was made on relatively cold steel giving a spiral length of 10 in. A subsequent test taken 10 min. later while the power had been raised sharply gave 17 in. Tests taken before and after final manganese additions gave 18 in. and 18¼ in., respectively, whereas tests three minutes later, before and after final silicon additions, gave 18½ in. and 26 in., respectively. Fluidity was greatly improved by the addition of silicon but was not changed by the manganese.

One series of tests involved measurements at the furnace as well as on the pouring floor. Just before adding the final additions of manganese and silicon the length of spiral was 17 and 16½ in. on two tests. Following the addition the flow increased to 20 and 20¼ in. At this point the bath was rabbled and tapped and optical pyrometer readings indicated the temperature as 2925 deg. F. Using a ½-ton capacity teapot ladle a mold was poured taking about 300 lb. of metal. Next two fluidity test pieces were poured and flow had fallen to 16¼ and 16½ in. as a result of heat loss to the ladle and atmosphere, the temperature indicated as 2730 deg. F.

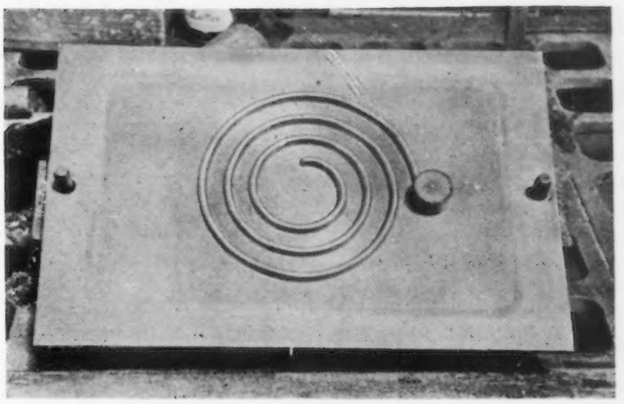
Two more large castings were poured and then three spirals were poured in order at one minute intervals. Only a small amount of metal was left in the ladle and temperature was falling rapidly. The casting lengths were 15¼, 14, and 12 in. in the respective pouring order. The temperature was estimated by quick pyrometer readings to be about 2680 deg. F. for the last mold. It was found possible, by associating the length of spiral obtained at the furnace before tapping with the manner in which the steel handled on the pouring floor and with the quality of castings obtained, to predict the casting behavior of any heat of steel. Spiral lengths of at least 20 in. are required before the addition of final deoxidizers in the practice at the Naval Research Laboratory. This usually results in a spiral length of 25 to 28 in. just prior to tapping. Thirty-two to 36 in. final fluidity is recommended for larger heats where more molds must be poured.

Following the satisfactory application of the spiral mold for fluidity measurements at the half-ton furnace at the Naval Research Laboratory, tests were made using the three-ton furnace at the Washington Navy Yard. In this case removal of the sample was thought to be complicated by the more intense heat from the larger door opening and the greater distance to the center of the bath. Planning for this, a larger and heavier spoon was welded to a 1½-in. diameter iron bar about 4½ ft. long. A pipe section 4 ft. long was then welded on the bar to give an overall length slightly greater than 9 ft. without unnecessary weight.

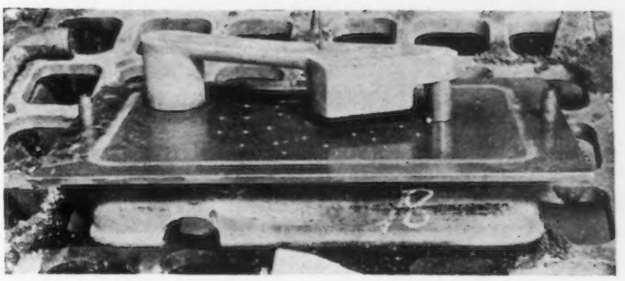
The heavy iron bar was necessary to prevent bending from the weight of sample when the rod heated up near the spoon. The technique for handling this sampling spoon is the same as for the smaller one used at the half-ton furnace except that as it is drawn from the furnace, two extra men are needed to support the sample and move it into position for pouring. This is done by means of a cross bar slipped under the rod at any convenient point between the sample and the operator.

Several satisfactory tests were made in this way, but it was later found that sampling could be done with the smaller spoon which requires only a single operator. In larger furnaces, however, this might be impossible and the use of

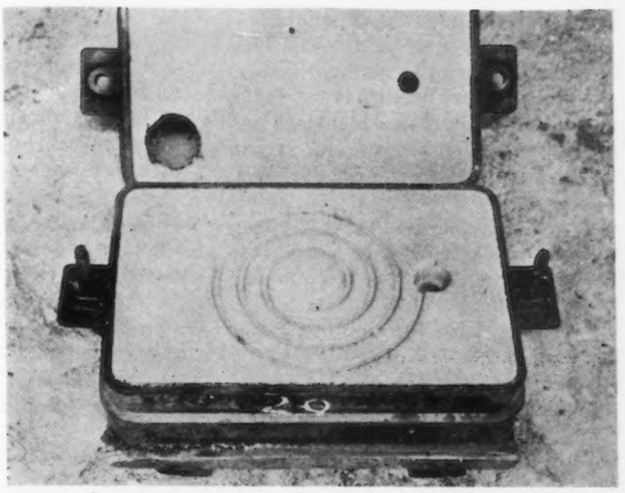
Fig. 2—Steps in Preparing Test Mold.



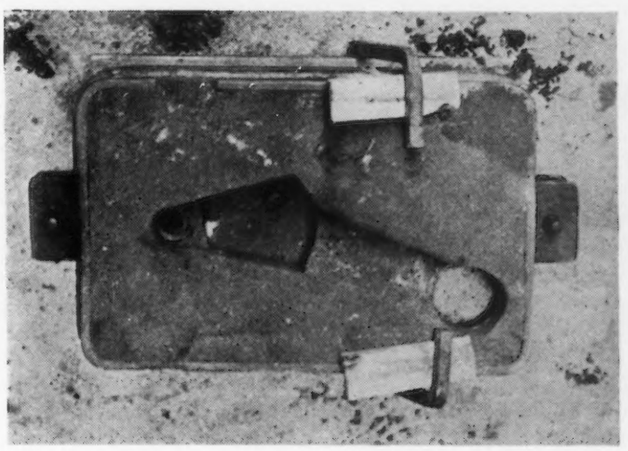
DRAG section, showing blind reservoir. →



COPE section with pouring basin pattern in place. Note raised reference marks. →



COMPLETED mold, ready for closing. →



ASSEMBLED and clamped mold, ready for pouring. →

the larger spoon would be necessary. The total time for making the complete test is well under 2 min. so the use of four men (three to handle the spoon and one to stir in the aluminum) is not a disturbing factor.

Results obtained from this work at the Washington Navy Yard are few because the method has only been tried for a short time. Tests taken before and after final deoxidizing additions to the furnace gave 26 and 36 in. of flow respectively on a plain carbon heat of approximately 0.20 per cent carbon. A nickel steel heat from which a spiral was poured just before tapping gave 49 in. flow. This steel was known to be more fluid than plain carbon steels because of the presence of 3½ per cent nickel.

Large Test Piece

The small mold previously described is satisfactory for half-ton or smaller ladles, but is unsatisfactory for larger bottom pouring ladles because of the rapid rate of flow of steel from the nozzle. At the request of the Norfolk Navy Yard for a method of measuring fluidity of cast steel under these conditions, the test piece was designed. This is merely a large scale modification of the smaller fluidity test mold. Principles of flow are identical and measurements made by the appropriate use of either test are comparable.

The molds can be made of green sand if desired, but dry sand is preferable when they are allowed to stand unused for more than a few hours. Ordinary molding methods are used and the effects of variables are the same as discussed for the small mold. The Norfolk Navy Yard made the mold of cores, thus obviating the necessity for a flask, and molds were made up and stored for use as needed.

When making a test the ladle nozzle is centered above the pouring reservoir and the mold filled at an ordinary rate. The metal builds up to the level of the overflow into the pouring button and fills the spiral under conditions as free from turbulence as possible. The overflow trough is 0.25 in. higher than the first and limits the variation in ferrostatic head to about this amount. As soon as the metal starts to flow into the overflow reservoir an observer calls "full" and pouring is stopped as quickly as possible. If metal should build up above the level of the overflow, the value of the controlled head would be lessened and it would be harder to shake the test casting from the mold than would be the case if pouring were stopped rapidly enough to prevent any metal being left on the slanting overflow.

Tests were made at the Washington Navy Yard and it was found necessary to place a sand baffle plate in front of the overflow into the spiral to prevent metal splashing or spurting prematurely into the flow channel and interfering with normal flow. This baffle also serves as a skim gate to keep slag or dross from getting into the test channel. A runner guide is always used.

After providing the baffle core, a series of tests was made at the Washington Navy Yard which proved the test piece to be satisfactory. Six dry sand molds were prepared and placed in position on the foundry floor. Small castings were being poured and several openings were necessary so that there was a large drop in the temperature of the steel between the beginning and end of pouring. A 10-ton ladle was used and after first pouring a large mold to heat up the nozzle, two test castings were poured. These measured 26 and 25½ in.

After approximately half the metal in the ladle had been poured into nine molds, the second pair of tests was taken. Only one spiral filled this test as sand had clogged the flow channel but the good spiral measured 19 in. After pouring nearly all the remaining metal into 16 molds, the final pair of tests measured 8 and 7 in. in the order poured. These tests, as well as one more series which gave equally good results, established the spiral mold as satisfactory for measuring the fluidity of cast steel on the foundry floor.

Tests of Practical Value

It is impossible to list all applications for this type of testing as they depend largely upon the individual foundry. For example, a small casting producer would only be concerned with the fluidity test at the furnace while the heavy casting manufacturer would also be interested in the condition of the metal at the time of pouring. By taking tests before, or before and after, pouring a large casting, it would be possible to tell the effect of fluidity on such factors as hot-tear, center-line weakness, etc.

If aggravated conditions in the cooled casting could be associated with the fluidity of the steel used, many current founding problems would be explained and the foundryman possibly provided with a means for their solution. It might prove practical to mark clearly on the pattern the spiral lengths of the metal to be used for pouring a particular casting. This would facilitate the manufacture of castings ordered from this pattern at some later date when the foundry details had been forgotten.

From the large number of tests conducted with the smaller fluidity mold and from the comparatively few trials made with the large type, several advantages can be claimed for the spiral as an effective medium for measuring the fluidity of cast steel. The mold is simple, convenient to prepare, economical, direct reading, and compact, and results obtained from its use are highly reproducible. No careful leveling is necessary and the design of the flow channel is such that differences in flow lengths satisfactorily indicate small variations in the fluidity of the steel.

Provision is made for 55 in. of flow, and while this length is seldom reached (never for plain carbon steels at temperatures below 3092 deg. F.) the difference in flow between extremely low temperatures and high temperatures or between very sluggish and very fluid steels is ample for testing under the most extreme conditions normally encountered.

For a given steel analysis and shop practice, it would be possible to calibrate the spiral directly in temperature units with a probable accuracy of ± 25 deg. C. (77 deg. F.). Such calibration would have to be done using a thermocouple maintained in the steel bath and pouring spirals at small increments of temperature. To date no refractory is available which can be used as a sheath for protecting thermocouples from the corrosive action of basic slags and temperature measurements in this way are extremely troublesome. Acid slags present no unusual difficulty, however, when quartz is used as a protecting sheath. Since temperature is not always a true criterion of the casting quality of steel, sole reliance on this quantity would many times be misleading. The more valuable calibration would be in terms of results obtained on the pouring floor.

Hydrogen Embrittlement

HEREIN are results of several years of study on methods of determining quantitatively the effect of hydrogen embrittlement as produced by commercial cleaning and plating solutions. Various relief treatments are discussed, as well as conclusions drawn from the results of the tests.

o o o

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THIS paper presents a simple method of determining quantitatively the effect of hydrogen embrittlement as produced by commercial cleaning and plating solutions. And, various curves and data show the effect of heat treatment on the susceptibility to embrittlement on several different steels. Drawing temperature, hardness, section, and chemistry as it affects hardness, are found to be the most important factors. Steels which are subject to a temper brittle range show the highest susceptibility to embrittlement at the range of 500 to 550 deg. F. The embrittlement in steel under 40 Rockwell C is negligible in most cases.

Quantitative data on embrittlement produced by various procedures are given as well as the effectiveness of its relief by thermal treatment. Of the plates investigated, chromium produced the greatest amount of embrittlement and lead the least. For plates of equal thickness tin is the easiest to relieve and silver the most difficult. Boiling water is the most effective means of relieving embrittlement at that temperature, air is considerably better at higher temperatures, and oil is comparatively poor at any temperature.

Although quite a few investigators have reported the lowering of fatigue strength on standard fatigue specimens due to electroplating, and a diminished workability of sheet in certain forming operations because of pickling, there is no published data, as far as the author is aware, either on the factors that influence this embrittlement phenomenon or simple means of detecting its presence.

These data reported here are an accumulation of occasional tests conducted over a period of several years, during which time the importance of certain factors was appreciated. All of these factors could not be thoroughly investigated, partly because of their multiplicity and partly because they did not involve production problems which, after all, were the underlying reasons for the investigation. Therefore, it is the intent of this paper to present the method of attack on the problem, and the results obtained, with the hope that it may be of some assistance to those having similar difficulties.

The problem of embrittlement first arose after the installation of the Bullard-Dunn process* for descaling after heat treating. A routine check on the crushing strength of tubular shaped pieces as tested between parallels in a testing machine had been instituted as a control of heat treating. When pieces cleaned by the Bullard-Dunn process were tested less than half the expected value was obtained.

By way of explanation, the Bullard-Dunn process consists of first removing grease in an alkaline cleaner and then subjecting the work as a cathode in a bath contain-

**Covered by foreign and American patents.*

ing about 10 per cent sulphuric acid and a very small amount of tin. Hydrogen liberated at the work surface blasts off the scale and as this takes place, a tin film is deposited on the clean surfaces, protecting them from acid attack while the descaling goes on at other points. When the descaling is completed, the entire work surface is covered with a film of tin. The latter protects the work so well that no etching whatever occurs, even when the work is left in the bath longer than is necessary for the descaling. The tin may be left on the work or it may be stripped in an alkaline bath as desired.

It should be pointed out that some investigators have found that embrittlement can be caused by a roughening of the work surface, as for example, by the etching that takes place in pickling; and also by hydrogen absorption. The data given later with respect to the Bullard-Dunn process, then, must reflect the embrittlement caused by hydrogen absorption alone because, as mentioned, etching does not occur when this process is used.

Although some published data state that embrittlement caused by hydrogen absorption cannot be completely removed by baking, subsequent tests proved that it could be, depending on the type of embrittling agent. One hour at 290 deg. F. or ½ hr. at 400 deg. F. in a Homo type furnace completely restored the crushing strength of pieces cleaned by the Bullard-Dunn process to that of uncleaned pieces or those cleaned by sand blasting. The Bullard-Dunn process should not be considered harmful to the most highly stressed parts if given this treatment. However, it must be borne in mind that this relief treatment is not sufficient to remove embrittlement produced in electroplating procedures, as will be discussed.

As authorities differ on the treatment for the relief of hydrogen embrittlement, test specimens of heavy walled tubing, 3 in. long, of SAE 6150 steel, were heat treated to about 50 Rockwell C. One-half of the test specimens were cleaned by sand blasting and one-half by the Bullard-Dunn process. The pieces were broken in a testing machine by transverse loading between parallels. The individual values obtained for one series of tests varied considerably, so that the average of at least 10 pieces was used for comparison. The breaking load or crushing strength of the pieces cleaned by the Bullard-Dunn process was only about 35 per cent of that of the pieces cleaned by sand blasting. In other words, there was a 65 per cent loss in crushing strength. Various temperatures for different lengths of time were tried to establish a satisfactory treatment for relief. Both 290 deg. F. for 1 hr. and 400 deg. F. for ½ hr. completely restored the crushing strength of the Bullard-Dunn cleaned pieces to that of the sand blasted pieces. These treatments were adopted as standard as they best suited the existing production set-up.

One of the first factors studied was the effect of hardness. This was accomplished by hardening a large group of tubular test pieces similar to those previously mentioned and drawing them in groups of 20 at various temperatures between 300 deg. F. and 1000 deg. F. at 100 deg. F. intervals. Half of each group was sand blasted and half descaled by the Bullard-Dunn process. The average, the high and the low crushing strength for each group was plotted, and the percentage loss was calculated from the average values for each drawing temperature, producing a curve representing the susceptibility of embrittlement. The peak of this curve occurred at 52 to 53 Rockwell C, or approximately at the 550 deg. F. drawing temperature. All subsequent test pieces were quenched and drawn at this temperature of maximum susceptibility.

Embrittlement Relief Treatments

A tabulation of the various relief treatments of pieces cleaned by the Bullard-Dunn process are shown in Table I. As previously stated, the results are the average of 10 test specimens, and for each group heat treated, a group of 10 was set aside and cleaned by sand blasting for comparison. The tin film of the Bullard-Dunn process was left on in these tests.

Further tests were conducted to study the effect of aging at room temperatures both with the tin film left on and removed. Although these tests were not carried out to conclusion, they indicated that for most purposes satisfactory relief might be accomplished in a reasonable time. The tin film tends to retard the rate somewhat. In ordinary manufacturing operations usually enough time has elapsed so that relief is practically complete by the time the piece gets into service. However, hydrogen embrittlement decidedly increases the susceptibility to grinding cracks in hardened steels. Where grinding operations follow soon after descaling, it is preferable to use a relief treatment.

The relief of embrittlement produced by the Bullard-Dunn process may be summed up as follows: (1) Relief can be completely accomplished by the proper time and temperature in oil, water or air. (2) Air is better than oil, and water better than air at the same temperature. Air is a better medium at temperatures above boiling water. (3) Aging at room tempera-

TABLE I

Bullard-Dunn Process and Its Relief Treatments

Temperature, Deg. F.	Time	Medium	Loss in Crushing Strength, Per Cent
Room	none		65
210	1 hr.	Small oven	30
290	½ hr.	Homo furnace	30
290	1 hr.	Homo furnace	0
350	10 min.	Homo furnace	45
350	½ hr.	Homo furnace	10
400	½ hr.	Homo furnace	0
170 to 180	10 min.	Water	60
170 to 180	½ hr.	Water	55
170 to 180	1 hr.	Water	50
170 to 180	2 hr.	Water	35
212 (boiling)	1 hr.	Water	15
212 (boiling)	2 hr.	Water	0
210	2 hr.	Oil	50 to 55
350	2 hr.	Oil	15
450	2 hr.	Oil	0

ture relieves embrittlement. (4) Aging at room temperature is more rapid when the tin plate is removed.

An investigation of the embrittlement effect of cadmium plate followed, using the same type of test piece, heat treatment and testing procedure as in the original tests. The separate groups listed in Table II were heat treated and plated as a group. The plating was done in a production line with no special handling or supervision to make it a laboratory test. The specimens in this case were prepared for plating by cleaning in an alkaline bath and then pickled in muriatic acid for 3 to 5 min. All pieces were plated so as to produce a plate thickness of from 0.0003 to 0.0005 in.

Current densities shown in Table III were such that approximately the same plate thickness was obtained in each case. This was an attempt to determine the cause for variation in per cent of embrittlement in different batches, as is shown in Table II. The initial effect ranged from 30 to 55 per cent loss in crushing strength.

Tests, the results of which are shown in Table IV, indicate that the cleaning cycle is probably the principal reason for the variation in embrittlement from batch to batch. The effect of a bright dip (chromic acid and sulfuric acid type) after plating both on the initial embrittlement and the rate of relief was found to be negligible. One variable on which no quantitative data were obtained is the effect of temperature of the pickle bath. In the regular cleaning procedure, the work may go through either a hot or cold water rinse or both after the hot alkaline cleaner. In any case, the work is fairly warm when put into the acid bath. Depending on the amount of work going through, the acid bath may get appreciably above room temperature, at which temperature the tests in Table IV were conducted. It is well known that the rate of reaction increases rapidly with increased temperature, but probably this increased reaction rate is not compensated for by a corresponding decrease in time in production work.

Table V shows the results of tests made to show the effect of aging on cadmium plate, emphasizing the fact that aging relieves embrittlement.

Other miscellaneous tests conducted along the procedure outlined included tests on the effect of the electrolytic cleaner alone, bonderizing, copper plate, and tin plate, as shown in Table VI. The bonderized test pieces were cleaned in a vapor degreaser while the plated pieces were cleaned in the usual way by an alkaline cleaner and acid dip.

TABLE II

Relief Treatments on Cadmium Plate

Temperature, Deg. F.	Time	Medium	Loss in Crushing Strength, Per Cent
Room	none	.....	30
290	1 hr.	Homo furnace	15
400	½ hr.	Homo furnace	15
Room	none	.....	55
400	½ hr.	Homo furnace	45
400	1 hr.	Homo furnace	35
*400	½ hr.	Homo furnace	0
Room	none	.....	35
350	1 hr.	Homo furnace	30
450	1 hr.	Homo furnace	25
550	1 hr.	Homo furnace	25
350	2 hr.	Homo furnace	25
350	4 hr.	Homo furnace	15
350	5 hr.	Homo furnace	10
350	6 hr.	Homo furnace	8
350	7 hr.	Homo furnace	5

*The cadmium plate was stripped from the test pieces in this test and then given the relief treatment to prove that the cadmium plate inhibited the relief.

TABLE III

Variable Effect of Cadmium Plate

Tank	Plating Conditions	Loss in Crushing Strength, Per Cent
A	Fast plate, 25 min.....	40
B	Fast plate, 25 min.....	40
A	Slow plate, 40 min.....	35
B	Slow plate, 40 min.....	30

TABLE IV

Effect of Pickle and Cleaning on Cadmium Plate

	Time, Min.	Loss in Crushing Strength, Per Cent
Pickle only, in 50 per cent muriatic acid	0	..
	3	20
	7	25
	15	35
	30	45
Pickle and cleaning	0	10
	3	30
	7	30
	15	35
	30	45

TABLE V

Effect of Aging on Cadmium Plate

Time at Room Temperature, Days	Loss in Crushing Strength, Per Cent
½	35
3	30
7	20
14	20

Test Standardization

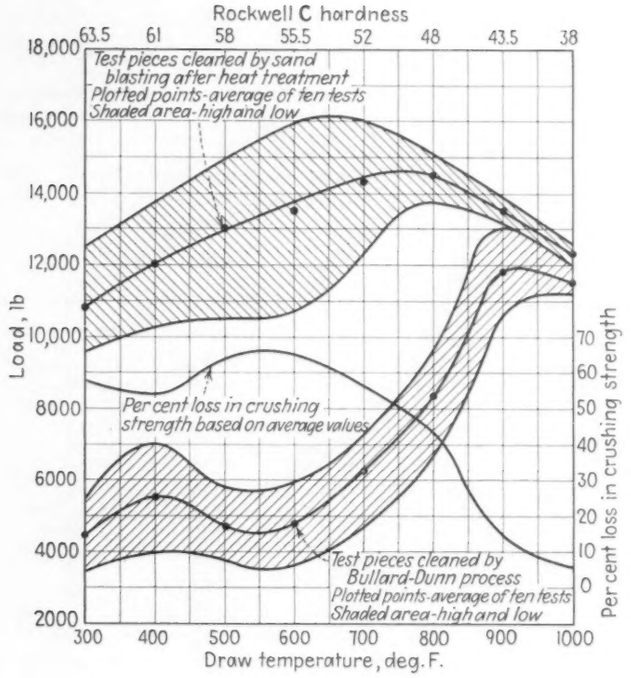
As materials other than SAE 6150 were being subjected to cleaning and plating, the question arose as to whether the maximum susceptibility to embrittlement occurred at the same hardness in all steels. SAE 52100 was selected because of its high hardness on the quench. As this material was not available in tubing, a machined test piece was used, the dimensions of which were 1⅜ in. o.d. x 1 in. i.d. x 1 in. long. They were just rough machined with a tolerance of plus or minus 0.010 in. on all dimensions.

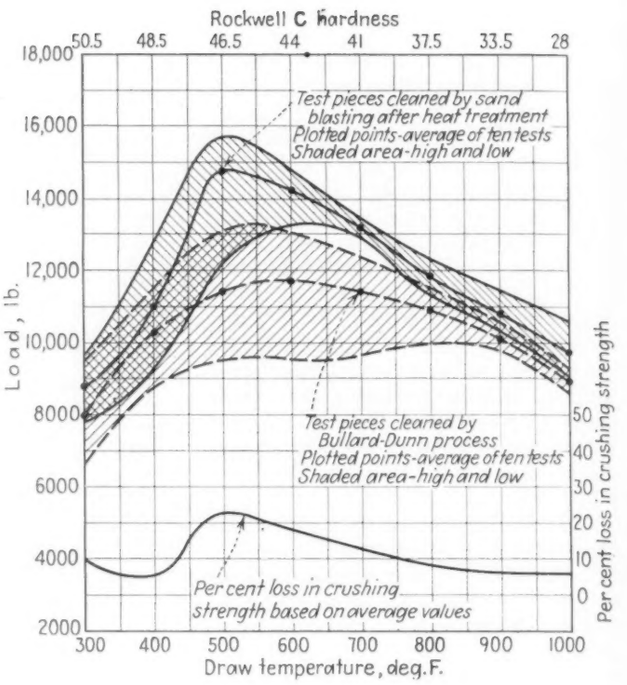
A study was then made on this SAE 52100 steel to determine the effect of heat treatment on the susceptibility to embrittlement. As in other tests, the whole batch of specimens was hardened at one time and drawn in lots of 20 at 300, 400, and so on up to 1000 deg. F. From each lot, 10 pieces were cleaned by sand blasting and the remaining 10 were cleaned by the Bullard-Dunn process. This latter method of in-

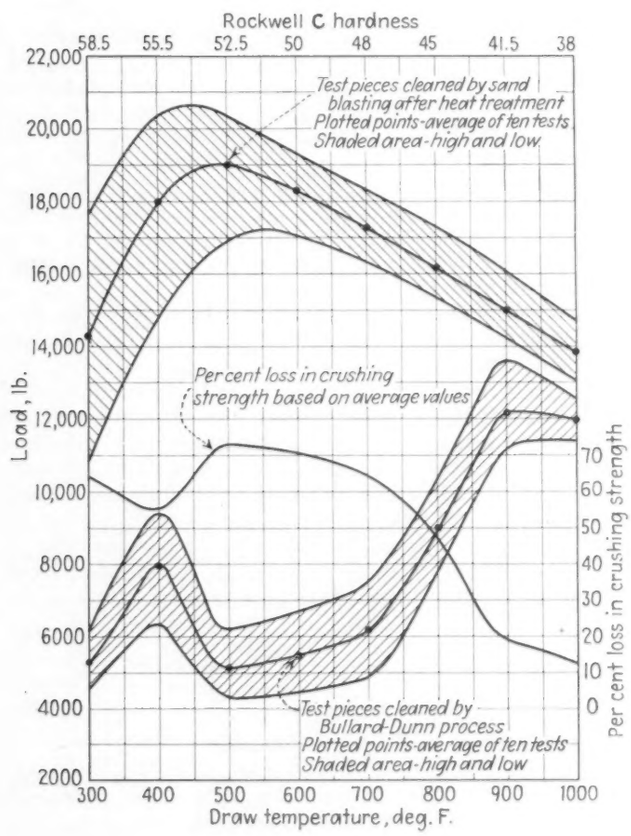
TABLE VI

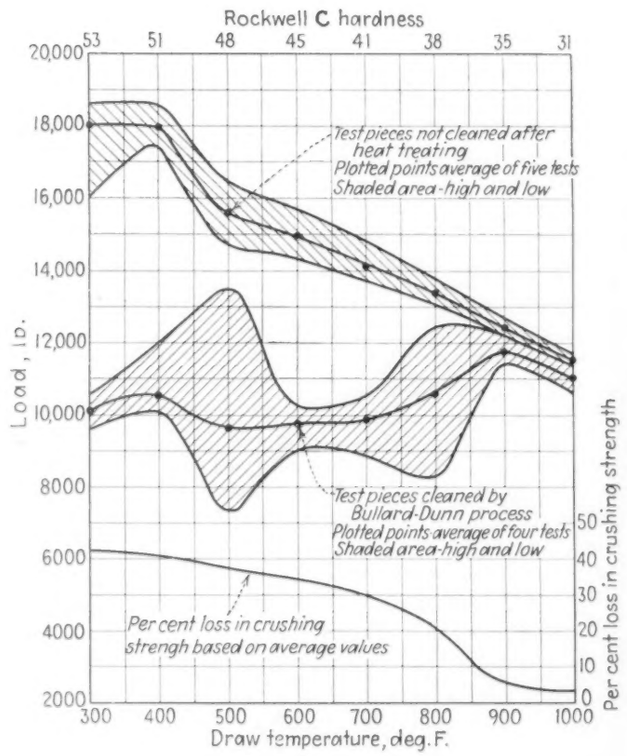
Additional Tests on Embrittling Media

Embrittling Media	Time Exposed	Loss in Crushing Strength, Per Cent
Hot alkaline cleaner	1 min. anodic 1 min. cathodic	0
Bonderizing	10 min.	3.5
Flash tin plate (alkali stannate)	2 min.	20
Flash tin plate (alkali stannate)	4 min.	40
Tin plate (alkali stannate)	½ hr.	55
Tin plate	1 hr.	55
Flash copper plate	2 to 4 min.	0
Copper plate	½ hr.	30
Copper plate	1 hr.	40


Rockwell C hardness
63.5 61 58 55.5 52 48 43.5 38
Test pieces cleaned by sand blasting after heat treatment
Plotted points-average of ten tests
Shaded area-high and low
Per cent loss in crushing strength based on average values
Test pieces cleaned by Bullard-Dunn process
Plotted points-average of ten tests
Shaded area-high and low
Load, lb
Per cent loss in crushing strength
Draw temperature, deg. F.


Rockwell C hardness
50.5 48.5 46.5 44 41 37.5 33.5 28
Test pieces cleaned by sand blasting after heat treatment
Plotted points-average of ten tests
Shaded area-high and low
Test pieces cleaned by Bullard-Dunn process
Plotted points-average of ten tests
Shaded area-high and low
Per cent loss in crushing strength based on average values
Load, lb.
Per cent loss in crushing strength
Draw temperature, deg. F.


Rockwell C hardness
58.5 55.5 52.5 50 48 45 41.5 38
Test pieces cleaned by sand blasting after heat treatment
Plotted points-average of ten tests
Shaded area-high and low
Per cent loss in crushing strength based on average values
Test pieces cleaned by Bullard-Dunn process
Plotted points-average of ten tests
Shaded area-high and low
Load, lb.
Per cent loss in crushing strength
Draw temperature, deg. F.


Rockwell C hardness
53 51 48 45 41 38 35 31
Test pieces not cleaned after heat treating
Plotted points average of five tests
Shaded area-high and low
Test pieces cleaned by Bullard-Dunn process
Plotted points average of four tests
Shaded area-high and low
Per cent loss in crushing strengh based on average values
Load, lb.
Per cent loss in crushing strength
Draw temperature, deg. F.

FIGS. 1 to 4—The curves of embrittlement for four different steels, as well as their crushing strengths in transverse loading, are shown in these four graphs. The size of the tubular test pieces used in these investigations was 1⅜ in. o.d. x 1 in. i.d. x 1 in. long. Fig. 1 (upper left)—Test pieces of SAE 52100 steel quenched in oil from 1520 deg. F., with 1-hr. draw as indicated in a Homo furnace. Fig. 2 (upper right)—Test pieces of SAE 1035 steel quenched in oil from 1550 deg. F., with 1-hr. draw as indicated in a Homo furnace. Fig. 3 (lower left)—Quenching in these tests was from 1550 deg. F. in oil, with 1-hr. draw in a Homo furnace. The test pieces were SAE 6150 steel. Fig. 4 (lower right)—Test pieces of SAE 4640 steel quenched in oil from 1475 deg. F. and drawn for 1 hr. in a Homo furnace.

ducing embrittlement was used again because, in the work done up to that time, it produced the most uniform results. The average crushing load for each group and the individual high and low value were plotted against drawing temperature. The percentage loss in strength was calculated from the average values, producing a curve of embrittlement susceptibility. This is shown in Fig. 1. It will be noticed that the hardness at the point of maximum susceptibility is in the same region. Consequently a fourth set of curves was derived from a group of SAE 4640 test pieces. Sufficient stock for only 72 pieces was available at the time these tests were made so that they were divided, after hardening, into groups of nine for drawing. These were subdivided again into two groups each, one of four which was cleaned by the Bullard-Dunn process and the other of five which was not cleaned at all. The results of the tests are plotted in Fig. 4, and pleted. Consequently, some of the tests tabulated may seem out of line. For example, quite a few tests were made using unmachined test pieces which later proved to give a lower effect than the standard machined specimens. Also, the effect of analysis was not observed until considerable other work had been done. No attempt has been made to convert these results or repeat them to put them on a common basis.

Table VII shows the embrittling

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FIG. 5 — These machined test pieces are SAE 4640 steel, drawn at 400 deg., 600 deg. and 900 deg. F., after being treated by the Bullard-Dunn process. Tests highly embrittled broke into four parts simultaneously and pieces less highly embrittled broke into two parts at the line of contact.

o o o

higher than the first work indicated, about 56 or 57 Rockwell C, but the drawing temperature was the same in both cases.

The coincidence of the drawing temperatures being the same introduced a new possibility. To check this the same tests were repeated on SAE 1035, the results being shown in Fig. 2.

To put the original work on a similar basis, standard size test pieces were machined from SAE 6150 bar stock, the steel used in the original examinations, and these results are shown in Fig. 3. The general characteristics of these curves are quite similar to the original set except that the maximum effect was slightly higher, running over 70 per cent where it had been 65 per cent, and the drawing temperature which produced it was nearer 500 deg. F.

These three sets of curves using the same size test pieces all show that the maximum susceptibility is in the temper brittle range of from 500 to 550 deg. F., and also that hardness is not the controlling factor. One point of further interest was whether a molybdenum bearing steel, supposedly free from a temper brittle range, also had a peak it is readily seen that there is no peak of susceptibility at the 500 to 550 deg. F. range, but the peak has moved apparently below the 300 deg. F. drawing temperature to possibly that of no draw.

Fig. 5 shows three typical machined test pieces after testing. These were SAE 4640 test pieces representing from left to right 400 deg. F., 600 deg. F. and 900 deg. F. draws, after being treated by the Bullard-Dunn process. Test pieces highly embrittled usually broke in four parts simultaneously. Pieces less highly embrittled broke in two parts at the line of contact. Usually the two cracks occurred very close together, the second crack always at a lower load than the first, and continued application of load would break it further into four parts. Sand blasted or uncleaned pieces even of the highest hardness broke in this manner. Where the embrittlement was low as in the 900 deg. F. draw, considerable distortion took place before cracking.

Additional Plating Tests

As previously stated, most of this work was done over a long period of time and is not presented in the same order that it was com-

effect of several plating procedures and the effectiveness of relief treatments. All of these results were obtained on machined test pieces, hardened and drawn at 550 deg. F. The chromium and hard nickel plating was done on SAE 52100 test pieces, but the identities of the other test pieces were not recorded in the notes. It will be seen that the plate thicknesses in all cases except one group of silver plated specimens were approximately 0.001 in. The cleaning treatment used was a standard cathodic alkaline cleaner followed by an acid pickle in every case except for the lead plate, where only an alkali cleaner, with no current, was used.

Tests were conducted to show the effects of copper plating before heat treating, as compared to tests showing the effects on pieces not plated but heat treated at the same time. The plating was of the thickness generally used to prevent carburizing, about 0.0008 in. Two standard electric furnaces were used, one using precombusted city gas as an atmosphere (A.F.) and the other having no atmospheric control (E.F.). Several important facts were immediately evident from the results of the tests made

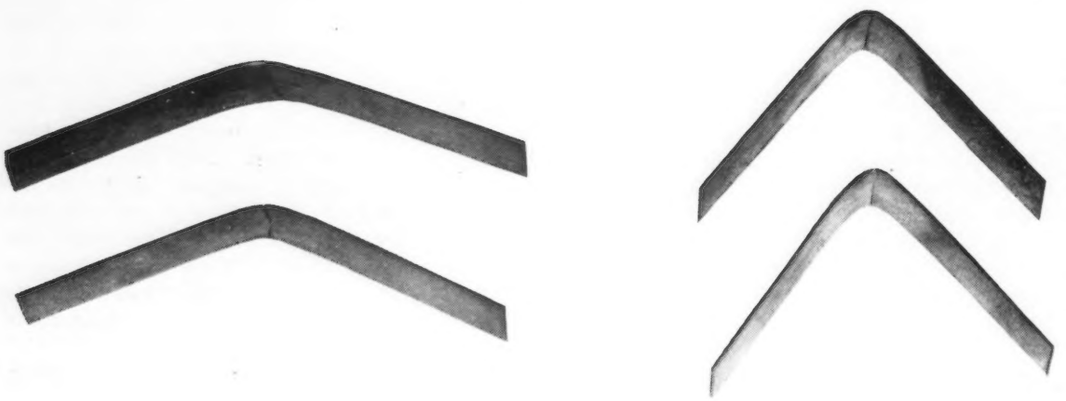

FIG. 6—The flat spring test pieces at left were treated cathodically for 2 min. in an alkali cleaner, while the pieces on the right were tested before any treatment.

with copper plating, as shown in Table VIII. When heated to a heat treating or carburizing temperature, copper plating produces a more or less permanent embrittlement which is probably due to the formation of a copper-iron alloy. In the test conducted in the electric furnace with no atmosphere control, most of the copper oxidized and flaked off during the hardening cycle while in the other furnace the copper remained bright. This explains the lower percentage loss in crushing strength of 10 per cent as against 35 per cent. Cyanide stripping bath produces an embrittlement which is readily relieved by heating to 290 deg. F. for 1 hr. This latter point is substantiated in Table IX.

The effect of wall thickness in SAE 1025 tubing was also examined. Tube specimens 1 in. long with a 2 13/16 in. o.d. were hardened and drawn at 550 deg. F. The ¼-in. tube walls were cleaned by sand blasting and had a crushing strength of 28,500 lb. per sq. in., while those specimens cleaned by the Bullard-Dunn process tested at 23,600 lb. per sq. in., a loss in crushing strength of 17 per cent.

Similar tests were made on tube specimens of 2 7/16 in. o.d., 1 in. long, with ⅜ in. wall thicknesses. These specimens were hardened and drawn at 550 deg. F. Those cleaned by sand blasting had a crushing strength of 65,600 lb. per sq. in., and those cleaned by Bullard-Dunn process had a crushing strength of 62,000 lb. per sq. in., or a loss in crushing load of 5.5 per cent.

Sand Blasting

Tests were conducted to show that neither sand blasting nor drawing at 290 deg. F. for 1 hr. after heat treating had any effect on embrittlement. The results were rather unexpected but may be explained on the basis that in sand blasting, a work hardening and internal stress effect may be produced, the latter predominating, as sand is more prone to a cutting rather than a peening action. This stress is relieved by the low draw allowing the work hardening effect to predominate. Test pieces were unmachined pieces of SAE 6150 tubing.

Treatment	Crushing Load, Lb. per Sq. In. (Average of 30 Test Pieces)
Sand blasted	43,200
Uncleaned	44,100
Sand blasted and drawn at 290 deg. F. for 1 hr.	45,400
Uncleaned and drawn at 290 deg. F. for 1 hr.	43,800

A recheck of the results of the tests to show the effects of sand blasting and drawing after heat treating were made on different size stock of the same material.

Treatment	Crushing Load, Lb. per Sq. In. (Average of 20 Test Pieces)
Sand blasted	61,000
Uncleaned	61,500
Sand blasted and drawn at 290 deg. F. for 1 hr.	64,600

The results of the first tests made indicate a 4 per cent increase in crushing strength for sand blasted test pieces drawn at 290 deg. F. for 1 hr. Likewise, an increase of 6 per cent resulted from the second examinations.

Tests on Flat Spring Steel

Further test on the embrittlement effect of cleaning and plating solutions were conducted on SAE 1080 flat spring stock. This type of test was suggested by the Wallace Barnes Co., Bristol, Conn., who furnished the test material. The stock was ½ in. wide x 0.025 in. thick, hardened and drawn in lead to a hardness of 53 Rockwell C and polished to a bright finish.

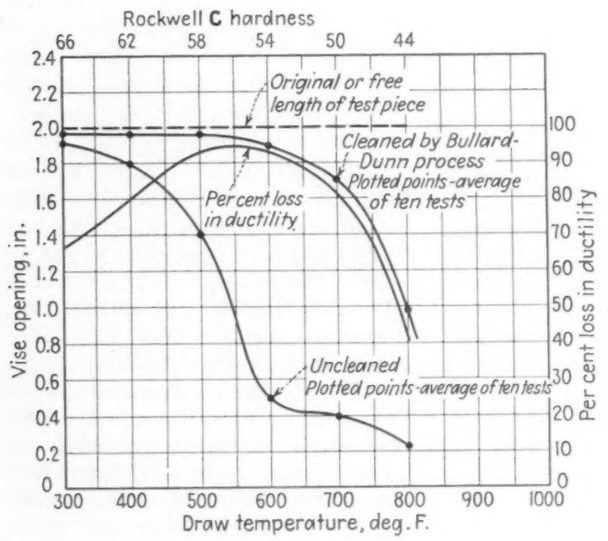

FIG. 7—Results of ductility tests on flat spring steel, tempered and polished, as determined by the measurement of a vise opening when the specimens were buckled to the breaking point. The steel was SAE 1080, quenched from 1450 deg. F. in oil with a 1-hr. draw as indicated in a Homo furnace. The test pieces were 0.025 x 0.50 x 2 in.

The test consisted of placing a 3-in. piece in a vise end-wise, and closing the vise so that the test piece buckled. The measure of embrittlement was the vise opening at which point the specimen broke. Actually, most of the test pieces were broken on a metallographic mounting press using a hydraulic jack, which procedure allowed for greater accuracy in measuring. All values shown in Tables X and XI are the average results of 10 test pieces, unless otherwise stated.

A very wide variation was found in the embrittling effect of the alkaline cleaner when the flat spring test piece was in the solution 1 min. cathodically and 1 min. anodically. There was no correlation between the effect and pH values (three different cleaners used in different production lines), nor could any set of results be duplicated in the same tank when tried immediately after. At some later date, tests showed that the embrittling effect was produced only when the work was cathodically treated, and there is absolutely no effect when the work is the anode. Typical values are shown in Table XII.

Fig. 6 shows a comparison of treated and untreated flat spring test pieces after breaking. On the left are two springs that were treated cathodically for 2 min. in an alkali cleaner while the other two pieces represent the "as received" condition. The pieces have been placed together to show the amount of permanent set after breaking. In highly embrittled pieces such as that produced by chromium plate, there is no permanent set. The pieces are perfectly straight or flat after breaking.

Strip Tests and Crushing Tests

An attempt to correlate strip and crushing tests with the original tests was made. Because in the softer tempers a 31-in. piece would not break, a 2-in. length was used. The spring stock, SAE 1080, was annealed and rehardened in an atmosphere furnace at 1550 deg. F. and drawn at 1 hr. at the indicated temperatures. As there was no means of measuring accurately the low pressure required to break the pieces, the vise opening value of embrittlement number was continued. Average values of each group of 10 pieces were plotted for uncleaned pieces and pieces cleaned by the Bullard-Dunn process. A third curve showing per cent loss in ductility was calculated from the first two. Results of these investigations are shown in Fig. 7, which discloses an embrittlement susceptibility curve, similar to previous tests, with a well defined peak at 550 deg. F.

Sand blasting shows a permanent effect on the strip test. Since different properties are measured in the two types of test described, no direct comparison can be made, but the tendency is in the same direction.

Treatment	Distance Between Vise Jaws, In.
Untreated stock	0.61
Sand blasted (fine sand)	0.66
Sand blasted (medium sand)	0.71
Sand blasted (medium sand and air drawn 290 deg. F. for 1 hr.)	0.75

It is interesting to note that a period of three years elapsed between the first and last tests. These tests were made on this heat treated strip stock and during that period the untreated pieces showed an increased ductility. The original value was 0.68 in. and at different intervals dropped to 0.65, 0.61, and finally to 0.57 in. Boiling water treatments and drawing at 290 deg. F. for as much as 2 hr. had no measurable effect on the ductility. No explanation is offered, but it emphasized one point—that frequent checks against a standard are

TABLE VII

Additional Tests on Electro-Deposited Plates

Plate	Thickness, In.	Relief Treatment Temperature, Deg. F.	Relief Treatment Time, Hr.	Loss in Crushing Strength, Per Cent
Chrome	0.001	none	none	70
	0.001	290	1	45
	0.001	400	1	40
	0.001	400	2	25
	0.001	500	1	0
Hard nickel	0.001	none	none	35 to 40
Silver	0.001	none	none	55
	0.001	400	1	50
	0.001	500	1	45
	0.001	550	2	30
Silver	0.0002	none	none	55
	0.0002	500	1	35
	0.0002	500	1 twice	0
*Silver	0.001	none	none	55
	0.001	400	1	55
	0.001	400	2	50
	0.001	500	2	45
	0.001	550	2	35
	0.001	550	5	30
†Lead	0.001	none	none	0

* Recheck on silver plate. † Cleaning treatment consisted of alkali cleaner only, with no current.

TABLE VIII

Effect of Copper Plate

Furnace	Draw, Temperature, Deg. F.	Copper Strip	Additional Draw, Temperature, Deg. F.	Loss in Crushing Strength, Per Cent
A.F.	550 for 1 hr.	no	none	35
E.F.	550 for 1 hr.	no	none	10
A.F.	550 for 1 hr.	Cyanide bath	none	40
A.F.	550 for 1 hr.	Cyanide bath	290 for 1 hr.	35

TABLE IX

Effect of Cyanide Stripping Bath

Time in Bath, Hr.	Relief Treatment Temperature, Deg. F.	Relief Treatment Time, Hr.	Loss in Crushing Strength, Per Cent
1	none	none	35
3	none	none	45
6	none	none	50
1	290	1	0

TABLE X

Effect of Various Plates on Strip Steel

Plate	Thickness, In.	Cleaning	Distance Between Vise Jaws, In. Average	High	Low
None	.....	None (as received)	0.68	0.78	0.62
Cadmium	0.0003	Standard—barrel with regular work	1.63	2.00	1.00
Cadmium	0.0003	Standard—still tank wired separately	2.39	2.40	2.24
Bullard-Dunn process	.....		2.66	2.74	2.54
Bright zinc	?	Pumice only (5 pieces)	2.00	2.29	1.88
Bright zinc	?	Standard	2.42	2.50	2.37
Chromium	0.0005	Standard	2.76	2.78	2.72
Silver	0.001	Standard	2.25	2.50	2.20
Lead	0.001	Pumice only	0.67	0.69	0.64

TABLE XI

Relief Treatment for Bullard-Dunn Process

Temperature, Deg. F.	Time	Medium	Distance Between Vise Jaws, In. Average	High	Low
Room	none	Untreated, 20 pieces	0.65	0.76	0.60
180	15 min.	Water	2.51	2.50	2.46
180	30 min.	Water	2.42	2.50	2.32
180	1 hr.	Water	2.33	2.48	2.20
180	2 hr.	Water	1.36	2.04	0.70
290	15 min.	Homo furnace	0.65	0.68	0.58
290	30 min.	Homo furnace	0.66	0.69	0.60
290	45 min.	Homo furnace	0.64	0.70	0.56
290	1 hr.	Homo furnace	0.61	0.66	0.54

necessary even when dealing with the same heat of material.

Conclusions

(1) Susceptibility to hydrogen embrittlement in general increases with hardness.

(2) Maximum susceptibility to hydrogen embrittlement occurs at the temper brittle range of 500 to 550 deg. F., except in steels that are not subject to a temper brittle range, such as molybdenum bearing steel. In such case, maximum susceptibility occurs at a much lower drawing temperature or perhaps at no draw.

(3) Susceptibility to embrittlement increases with the hardening constituents, primarily carbon.

(4) Hydrogen embrittlement will tend to dissipate on standing at room temperature and can be hastened by heating.

(5) Complete relief of hydrogen embrittlement depends upon the embrittling medium or type and thickness of plate.

(6) Temperature is a much more potent factor than time in relief treatments.

(7) Hydrogen embrittlement effect increases with decreased section.

(8) Hydrogen embrittlement in steels heat treated to a hardness of 40 Rockwell C or under is negligible in most cases. This statement is restricted to heat treated steels since there is evidence that cold worked material is susceptible to hydrogen embrittlement at lower hardness than the same material heat treated to a corresponding hardness.

Acknowledgment

The author wishes to express his appreciation for the cooperation received from the management, metallurgical staff and heat treating department of Pratt & Whitney division, United Aircraft Corp., where this work was initiated, and to Jacobs Aircraft Engine Co., where it was continued. Acknowledgment is also given Republic Steel Co., Bethlehem Steel Co. and Wallace Barnes Co., for material and suggestions; International Nickel Co., MacDermid, Inc., and Pratt & Whitney division, Niles-Bement-Pond Co., for the treatment of test specimens; and to the Bullard-Dunn Process division of the Bullard Co., for treatment of specimens and permission to publish data about their process.

TABLE XII

Effect of Alkali Cleaner with Current

Time as Anode	Time as Cathode	Distance Between Vise Jaws, In. Average	High	Low
1 min.	1 min.	1.77	2.12	0.64
1 min.	1 min.	0.73	0.88	0.66
1 min.	1 min.	2.03	2.34	1.88
none	none	0.57	0.60	0.64
2 min.	none	0.57	0.60	0.54
none	2 min.	1.60	1.88	1.32

Regalvanizing Welded Joints

REGALVANIZING of welded joints at the time of welding, without redipping, is said to be possible by a process developed by Galv-Weld, Inc., Dayton, Ohio. Regalvanizing is accomplished by applying a low melting point galvanizing material, in stick form, to the weld area while the metal is still hot and then spreading the galvanizing material with a wire brush. It is said that no special apparatus is required and no heat other than the residual heat in the weld is required. The coating is claimed to form a smooth, continuous layer possessing all the wearing qualities of the original galvanized coating.

A WELDED joint treated by the Galv-Weld process of regalvanizing is shown above. The company states that after four years of constant exposure, the joint shows no signs of rusting.

The process may be used with arc, gas and spot welding and is applicable to both large and small work. It also permits the use of galvanized sheets and shapes in fabricating, in place of uncoated steel which must be galvanized after fabrication.

An additional feature of the Galv-Weld process is said to be that it permits the painting or enameling of a welded joint without danger of sweating. The necessity of applying a filler coat before finishing such a joint is eliminated and the surface can be baked.

National distribution of Galv-Weld materials to licensed users has been arranged through the Metallic Products Division of Eagle-Picher Lead Co. The process is covered by patent No. 2,224,953, with others pending.

Casting Pit Refractories

By J. H. CHESTERS
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United Steel Companies, Ltd.
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• • • Completing last week's discussion of casting pit refractories, the author considers the construction of ladle sleeves, trumpets, and guides, and discusses runner, center and mold top bricks, tundish tiles, and non-metallic inclusions.

Ladle Sleeves

A—Construction:

The stopper rod is protected from the surrounding metal and slag by a series of fireclay tubes generally known as ladle sleeves or rod covers. See Figs. 2 and 6. The external diameter of the sleeve varies somewhat with the ladle size, being 5 or 6 in. for an 80-ton ladle. The sleeve next to the stopper end is generally rather larger in diameter than those immediately above, while a similar large sleeve is often used at the top of the rod to give additional protection against slag in the period between tapping and teeming. The inside diameter of the sleeve is about 2 in. which is somewhat greater than that of the stopper rod itself. The space between is often filled with fine sand. The ends of the rod covers are generally made with tongue and groove joints since these give steel tightness with a minimum of cement, but stepped joints are also employed quite successfully.

Considerable care must be taken with the stopper rod assembly to insure that no cracked sleeves are employed and that the expansion allowance is adequate. The stopper end is first fitted on the end of the rod and then the sleeves are slid on and the joints between them made up one at a time. Fireclay cement is satisfactory for this purpose but where particularly good joints are required, chrome cement is sometimes employed. The expansion of the sleeves during the heating up period and when the steel enters the ladle is taken care of by leaving a gap between the top sleeve and the cotter pin or by means of a spring and washer. Before insertion in the ladle the stopper rod assembly must be carefully dried. At one time this was done by placing the stopper rods against a furnace but nowadays special drying stoves are employed.

B—Material:

The properties of ladle sleeves have recently been the subject of a detailed investigation by Heindl and Cooke. The principal outcome of this study was the revelation that the refractoriness of sleeves in use in the United States was frequently inadequate. The properties of a number of British rod covers are shown in Table III. It will be seen that all these samples had a melting point of over 3020 deg. F., but samples taken from the same suppliers on subsequent occasions have shown that this value can fall as low as 2930 deg. F. Some of Heindl and Cooke's samples showed a melting point of only 2831 deg. F. and since the use of material of this type was associated with stopper rod trouble, they concluded that rod covers should have a pyrometric cone equivalent to a temperature above which steel is cast, that is, 2912 to 3038 deg F. The porosities shown in Table III vary over a wide range, namely 15.3 to 29.0 per cent. Further consideration shows that this is not surprising since the porosity of a rod cover is essentially a compromise. Thus, if the porosity is too high the slag resistance is likely to be low, while if the porosity is low the conductivity will tend to be high and the thermal shock resistance low. For this reason Heindl and Cooke suggest a minimum porosity of 15 per cent.

The thermal shock resistance of rod covers is clearly most important since spalling will result in ex-

posure and subsequent failure of the stopper rod. Most of the trouble experienced due to spalling comes from over-firing or from lamination of the type shown in Fig. 9. No really satisfactory method of determining the thermal shock resistance of ladle sleeves has yet been developed, the present test being carried out on a 2-in. thick ring sawed from the test sample.

	Firing Temperature	
	1832 deg. F.	2012 deg. F.
Apparent porosity, per cent	27.2	19.0
Bulk density, lb. per cu. in.	0.6969	0.7402
Permeability to air, c.g.s. units (2 skins)	0.0076	0.0030
Thermal shock resistance, 1652 deg. F. test	16, 14 — 15	5, 6 — 6
Mineralogical constitution, X-ray data	Quartz and alumina, small amount of mullite	Quartz and cristobalite, large amount of mullite

The influence of firing temperature on the properties of rod covers is most remarkable as is shown by a comparison of the following data obtained on two otherwise similar samples:

The striking difference in mineralogical constitution of casting pit refractories fired at different temperatures is illustrated by Fig. 10 which shows photometer curves for refractories fired at 1832 to 1922, 2012 to 2102, and 2282 deg. F. It will be seen that the soft fired sample still contains a great deal of free quartz, which largely disappears on firing to 2282 deg. F. Simultaneously the mullite development can be observed and the increased intensity of the pattern of cristobalite. The temperature range in the above example, that is, 1832 to 2012 deg. F., is peculiarly susceptible to X-ray study since gamma alumina is still present in the poorly fired material, but given adequate standards for various types of clays and different firing temperatures, the method can be used over a fairly wide temperature range.

C—Life and Causes of Failure:

Since in the normal way the stopper set-up is only used once, the properties of the rod covers need only be such as to insure efficient working during a comparatively short life. Indeed, where stopper trouble might arise, for example, due to the practice of holding the metal in the ladle, a duplicate set of stopper rods and nozzles is often employed. The diameter of the nozzle in the second set is considerably greater than that in the first so that if the metal is too viscous to flow readily through the first nozzle, the second can be employed. The conditions to which the rod covers are exposed are similar to those experienced by the ladle brick themselves. The sleeves must, therefore, have adequate slag resistance which will depend, as with the ladle brick, on both the refractoriness of the clay and the firing treatment received. The latter is particularly important since underfiring results in low slag resistance, probably due to the lack of intercrystallization of the mullite, while over-firing may lead to spalling. As with ladle brick, blackcoring is particularly bad since it results in a sudden increase in wear once the core is reached. The longer the teeming time and the hotter the steel, the more important becomes the quality of the rod cover required, though the demands can be considerably alleviated by the use of rod covers of thicker section, for example, 6 in. instead of 5 in. external diameter.

D—Lines of Improvement:

The present need would appear to be for more adequate control of the quality of the clay used and of the firing treatment received rather than the development of any new or improved type of rod cover.

Trumpets and Guides

If the steel is to be bottom-poured, that is, introduced into the ingot molds from the base instead of from the top, then a rather complex arrangement of fireclay pipes, usually described as guides and runners, is required. The steel from the ladle enters the set-up by way of a funnel or trumpet (see Fig. 11) which permits of a fair amount of spread without loss of metal. The steel then passes down vertical tubes of circular cross-section, divides into a number of streams in the crown or center brick at the base, and thence proceeds through the runner bricks, generally two or three in each arm, to the molds.

The trumpet and guide bricks are held in a split cast iron mold, similar in internal contour to the external contour of the guides and trumpet. The clearance between the two may be small, in which case the refractories are set dry, or alternatively the space may be considerable, in which case the guides are set in a ganister cement. The internal diameter of the guide tubes is, as might be expected, considerably greater than that of the individual runners which it feeds. In some works the trumpet and guide tubes are first set up on a central rod which is only removed after the assembly has been placed in position in the split cast iron mold.

The properties of a number of guide tubes are set out in Table

TABLE III
Properties of Ladle Sleeves

	A	B	C	D	E
		(badly cored)			
Apparent porosity, per cent	29.0	22.0	16.6	15.3	21.5
Bulk density, gm. per c.c.	1.90	2.03	2.07	2.05	2.10
lb. per cu. in.	0.6861	0.7331	0.7475	0.7403	0.7583
Apparent specific gravity	2.67	2.60	2.49	2.42	2.67
Permeability to air, c.g.s. units	0.009 (2 skins)	0.0003 (2 skins)	0.00081 (2 skins)	0.0017 (2 skins)	0.0045 (2 skins)
After shrinkage (−) or expansion (+) per cent, 2 hr. at 2570 deg. F.	+3.3	+2.7	+2.3	−0.2	+2.3
Thermal shock resistance, 1652 deg. F test	2 in. section 3, 3 average 3	2 in. section 1, 1 average 1	2 in. section 5, 5 average 5	2 in. section 5, 5 average 5	2 in. section 11, 8 average 10
Cone melting point	3047 deg. F.	3029 deg. F.	3128 deg. F.	3074 deg. F.	3056 deg. F.
Free quartz, per cent, estimated by microscope	8	20	2	5	8
Chemical analysis:					
SiO_2	56.38	62.26	53.64	56.72	55.65
FeO	5.44	4.48	2.84	3.21	4.62
Al_2O_3	35.08	30.29	38.96	36.30	35.05
TiO_2	1.16	1.03	1.50	1.29	1.29
CaO	0.22	0.12	0.04	....	0.06
MgO	0.83	0.72	1.60	1.32	1.60
Loss on ignition	0.12	0.28	....	....	....

IV and it will be seen that these are similar to those of the runner brick described later. Good shape and accuracy of size are essential, particularly if dry setting is employed, since otherwise the bricks open up on cracking and the metal escapes. The bottom guide has a flange at one end which fits in a slot in the cast iron case and its position is, therefore, determined. The other guides are pushed up to this and the trumpet kept in contact with the last guide, either by pressure of the case, by means of wedges, or by the use of cement. Some cracking in use is inevitable but the quality of the clay and the firing treatment should be such that this is not excessive since otherwise shattering of the guide tubes and consequent contact of the metal with the cast iron case may occur. The actual "cut" on the bricks in service is slight, but what material does wear off undoubtedly enters the steel. Whether any remains there has still to be shown.

TABLE IV
Properties of Guide Tubes

	A	B
Apparent porosity, per cent	20.0	19.4
Bulk density, gm. per c.c.	2.13	2.11
lb. per cu. in.	0.7692	0.7719
Apparent specific gravity	2.67	2.62
Permeability to air, c.g.s. units, Perpendicular and through both skins	0.0013	0.00022
After-expansion 2 hr at 2570 deg. F., pe. cent	2.3 (bloated)	2.8 (bloated)
Thermal shock resistance, 2 in. section of 6 in. external diameter guides	5	2
Cone melting point	3038 deg. F.	3020 deg. F.
Free quartz, per cent, estimated by microscope	4	4

Runners and Center Brick

The steel leaving the guide tubes passes from the center brick to the various runners, of which there are generally two, four, six or eight on a plate. The runner bricks must be true to shape and size since they must fit into a cast iron base plate and must be of the right length so as to permit of precise location of the molds. They are often set dry but the top face, particularly the joints, is generally covered with cement prior to placing the cover plates and ingot molds in position. Here again the thermal shock resistance must be sufficient to avoid shattering but in the author's opinion some cracking always occurs due to the very sudden increase in temperature when the steel stream arrives.

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FIG. 9 — This laminated rod cover was subjected to a thermal shock test.

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The properties of a number of typical runner bricks are given in Table V. It will be seen that all the samples have a refractoriness of 3074 deg. F. or over. This has by no means always been the case and, indeed, in Germany certain workers, for example, Körber, definitely prefer a siliceous brick which they claim is more resistant to attack. In the writer's experience any advantage gained by the use of a siliceous material is due to the fact that in general its physical texture is better than that of the more refractory brick, and that provided the latter is made from finely ground de-aired clay and sufficiently well fired it will give better results. As will be seen from Table V the porosity of the runner bricks varies widely but their permeability is always low.

The thermal shock data also show a considerable variation but it is interesting to note that the bricks having the highest thermal shock resistance were de-aired. It is not suggested that de-airing necessarily gives an increased thermal shock resistance, but the above fact at least shows that the use of de-airing to obtain high density does not lead to poor thermal shock resistance. One point that has been noted by a number of workers is that the slag left on the runner after a cast of steel has been made is often high in manganese, even when the content of manganese in the steel is comparatively low. There is no doubt that some selec-

TABLE V
Properties of Runner Bricks

	A	B	C	D	E	F
Apparent porosity, per cent	22.0	20.9	17.5	30.5	28.1	20.4
Bulk density, gm. per c.c.	2.09	2.04	2.11	1.85	1.89	2.07
lb. per cu. in.	0.7547	0.7367	0.7619	0.6681	0.6825	0.7475
Apparent specific gravity	2.68	2.58	2.55	2.68	2.63	2.59
Permeability to air, c.g.s. units	0.00096 (2 skins)	0.00074 (2 skins)	0.0026 (2 skins)	0.0012 (2 skins)	0.015 (2 skins)	0.0084 (2 skins)
After shrinkage (−) or expansion (+) per cent, 2 hr. at 2570 deg. F.	+0.9	+2.7	+2.5	−1.1	+3.9	+2.0
Thermal shock resistance, 1652 deg. F. test	2 in. section 4, 4 average 4	2 in. section 2, 7 average 4	2 in. section 4, 3 average 4	2 in. section 4, 5 average 5	2 in. section 10, 11 average 11	2 in. section 7, 12 average 10
Cone melting point	3074 deg. F.	3092 deg. F.	3146 deg. F.	3074 deg. F.	3092 deg. F.	3128 deg. F.
Free quartz, per cent, estimated by microscope	10	13	2	12	8	4
Chemical analysis:						
SiO_2	56.84	57.10	53.46	58.41	55.79	56.26
FeO	5.12(Fe_2O_3)	3.36(Fe_2O_3)	2.82	2.95	3.21	2.57
Al_2O_3	35.14	37.00	39.13	34.36	36.24	36.67
TiO_2	0.72	0.74	1.29	1.29	1.32	1.40
CaO	0.26	0.24	0.06	....	....	....
MgO	0.53	0.58	1.03	1.19	1.23	1.37
Loss on ignition	0.16	0.22	....	....	....	....

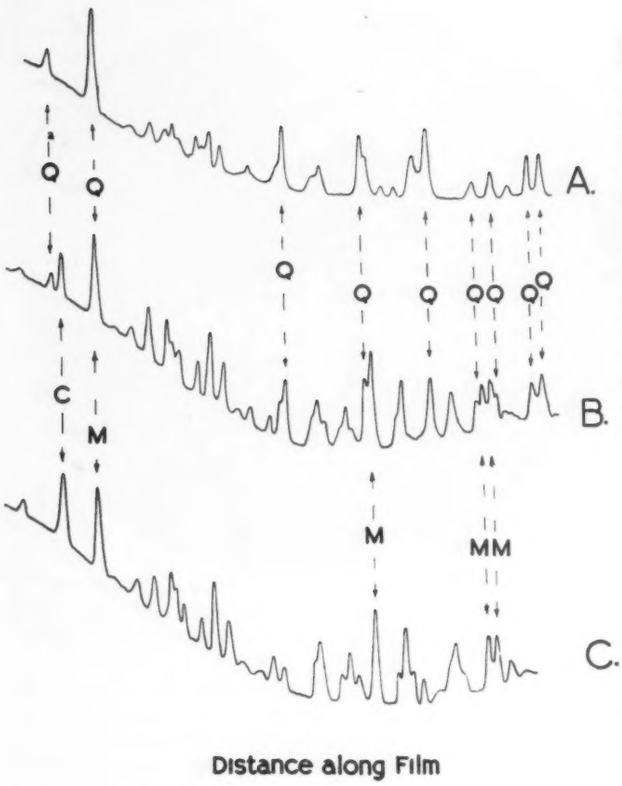

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FIG. 10—The photometer curves obtained from Debye-Scherrer X-ray photographs of siliceous fireclay casting pit refractories fired at: (A) 1832 to 2101 deg. F., (B) 2012 to 2102 deg. F., and (C) 2282 deg. F. The arrows indicate the prominent lines of (Q) quartz, (C) cristobalite, and (M) mullite.

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BELOW

FIG. 11—This is an arrangement of guide tubes, center brick, and runners for bottom pouring an 80-ton cast.

TABLE VII
Properties of Tundish Tiles

	A	B
Apparent porosity, per cent	33.1	25.4
Bulk density, gm. per c.c.	1.79	1.88
lb. per cu. in.	0.6464	0.6789
Apparent specific gravity	2.67	2.53
Cone melting point	3074 deg. F.	3038 deg. F.
Thermal shock resistance, 3x2x2 in. section	30+	30+

tive action takes place, possibly due to the reduction of silica by manganese in the steel, and that the attack is more severe with high manganese casts.

The center brick is rather complex in shape, as will be seen in Fig. 12. It is handmade, the material used being similar to that employed for the runners.

Top Bricks and Compo Heads

Both in bottom and in top pouring, the steel is prevented from chilling rapidly when it reaches the top of the mold by means of a lining of fireclay bricks or ramming material. A great variety of shapes and sizes of bricks is used for this purpose, some of the types employed in United Steel works being shown in Fig. 13. The simplest type of liner consists of a refractory cylinder similar to a guide tube but this is only employed in small ingots while the next simplest consists of four flat tiles with beveled edges which fit into a square mold and are held in position by means of wooden wedges. The latter not only serve to facilitate assembly but also act as expansion joints when the hot metal rises in the mold and heats the brick.

If the allowance is insufficient, the bricks may shatter and large lumps may fall into the rising column of steel. Given adequate supervision and reasonably fluid steel, such lumps will float, but examples have been observed where large particles of brick have remained trapped even half way up the ingot. As with rod covers, spalling is generally associated with overfiring or flashing of the wear by bare flame. In this connection a study has been made of the influence of the position in the kiln on the thermal shock resistance of mold top bricks. The degree of correlation obtained was quite surprising, the thermal shock resistance as determined on the ordinary 3 x 2 x 2 in. test piece rising steadily as the position of the mold top brick moved from the outside of the kiln toward the middle. Spalling may also be due to molding faults, which are particularly common in this type of refractory due to manufacturing difficulties.

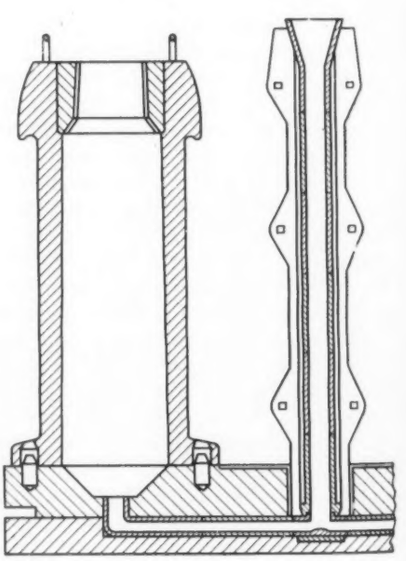
The properties of four different mold top bricks are set out in Table VI. The particular samples examined all had a refractoriness of 3056 deg. F. or over which is probably somewhat higher than is strictly necessary, except where bricks are to be used more than once, as in built up inserted heads. A somewhat higher porosity is expected than with other casting pit refractories since this not only leads to higher thermal shock resistance, but also increases the insulating value of the firebricks.

Mold tops can also be rammed, for example, with ground firebrick or crucible pots bonded with raw clay. Such heads are made by tamping the material, using vibrating machines as in molding sand practice, and can be employed for several casts.

In passing, mention should be made of anti-piping compounds which act as a heat generating mold top on the surface of the metal and are themselves often quite refractory. Originally, cinders, sawdust or straw was employed, but more efficient mixtures, like clay-graphite, are now used.

Tundish Tiles

Where a steadier stream is required or more than one ingot must be poured at once, a single or multiple tundish or pouring basket is used. A number of different types are illustrated in Fig. 14. The tundish consists essentially of an iron trough lined with suitable fireclay tiles, each section having its own nozzle. A reasonable amount of spalling resistance is necessary though both the spalling and the chilling of the metal can be reduced by heating the tundish with fires



prior to use. The properties of two recent deliveries of tundish tiles are given in Table VII.

Non-Metallic Inclusions

Periodically, casting pit refractories are blamed for the dirtiness of steel. Where an appreciable sized piece of refractory is found trapped in the metal, a comparatively rare occurrence, its identification is not difficult, but the diagnosis with smaller inclusions leaves a good deal to be desired. Chemical analysis of non-metallics extracted by the electrolytic or iodine methods, may show an alumina-silica ratio similar to that found in fireclay bricks, but this may be purely accidental since other analyses show very different ratios.

Even where mullite has been demonstrated, for example, by X-ray or microscopic work, there is no proof that this came from the fireclay brick since the oxidation of aluminum and silicon in the metal and their subsequent reaction might give the same result. Indeed where aluminum is used in large quantities, no difficulty is experienced in proving the presence of corundum on the surface of the ingot. The identification of quartz on the other hand, which has been successfully carried out by certain workers, would appear to be much more definite evidence of refractory origin because it is most unlikely that quartz would be formed in steel by the oxidation of silicon, since it is unstable above 1598 deg. F.

There can be little doubt that the nozzle, stopper, guide tubes and runners all contribute dirt, which enters the steel, since all these refractories show an appreciable wear during service. The point that requires to be elucidated is how much of this dirt remains in the steel. Thus, in one very striking experiment, some 8 lb. of ground up runner brick were introduced into the trumpet and it was subsequently found that the ingots so treated were quite as clean as the normally treated ingots of the same cast.

We do not suggest that there should be any relaxation in the struggle for cleanliness in all phases of the steel-making process or that such extreme precautions as vacuum cleaning molds should be abandoned, but it is believed that a great deal more work is required before the extent to which the casting pit refractories are responsible for non-metallic inclusions can be stated at all definitely. In this connection one other observation would also appear important, namely, that in actual fact no difference is found between the cleanliness of well made steel of correct fluidity made by top or bottom pouring in spite of the fact that in bottom pouring the steel passes through several yards of fireclay pipe not present in the top pouring set-up. It is also interesting to note that analyses of inclusions (or exclusions, that is, scums) almost always show considerable amounts of iron, manganese, alumina and silica, but very little lime. This shows that little if any of the dirt is basic slag from the open hearth furnace and also suggests the possibility of using basic casting pit refractories as has already been done to some extent for launders and ladles, though as yet with no conclusive results.

Fig. 12—This center or crown brick and end runner is used in bottom pouring.

Acknowledgment

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TABLE VI
Properties of Mold Top Bricks

	A	B	C	D
Apparent porosity, per cent	32.6	26.7	30.2	27.7
Bulk density, gm. per c.c.	1.80	1.91	1.86	1.91
lb. per cu. in.	0.65	0.6897	0.6717	0.6897
Apparent specific gravity	2.68	2.60	2.67	2.64
Permeability to air, c.g.s. units	0.018 (2 skins)	0.012 (2 skins)	0.0098 (2 skins)	0.0048 (2 skins)
After shrinkage (−) or expansion (+) per cent, 2 hr. at 2570 deg. F.	+4.2	+1.8	+2.1	+0.7
Thermal shock resistance, 1652 deg. F. test	3x2x1½ in. section 10, 9 average 10	3x2x1½ in. section 30+, 14 average 22+	3x2x1½ in. section 4, 5 average 5	3x2x1½ in. section 10,26 average 18
Cone melting point	3056 deg. F.	3056 deg. F.	3056 deg. F.	3110 deg. F.
Free quartz, per cent, estimated by microscope	10	8	18	8
Chemical analysis:				
SiO_2	57.46	59.10	62.54	54.52
Fe_2O_3	4.88	5.04	4.40	3.44
Al_2O_3	34.89	32.80	30.10	39.28
TiO_2	0.99	0.98	1.04	1.15
CaO	0.48	0.50	0.28	0.52
MgO	0.83	0.72	0.68	0.90
Loss on ignition	0.30	0.30	0.32	0.28

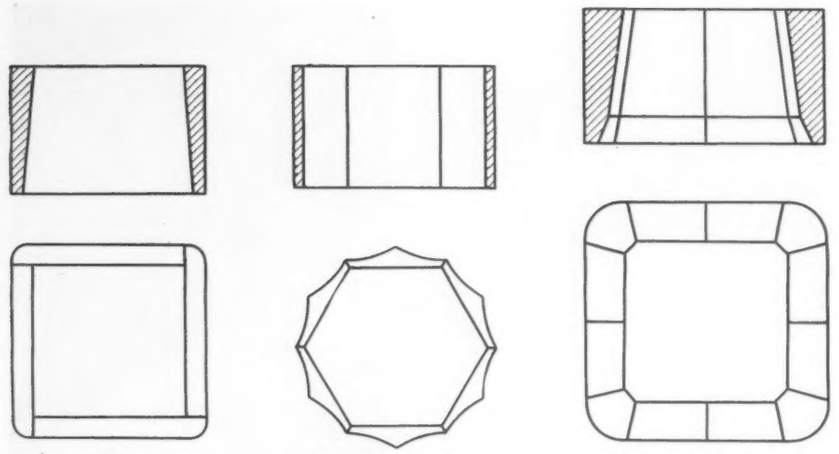

Fig. 13—These are typical designs of mold top and "Compo" head bricks.

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taining some of the photographs and figures, and to various colleagues in the steel and refractories industry for their constant collaboration.

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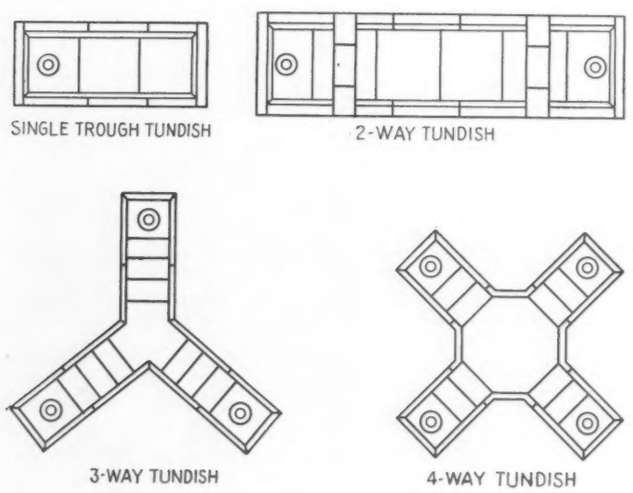

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FIG. 14—Various tundish arrangements.

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Guideless Bar Straightening Machine Developed

BY grouping three rolls, one driven (left) and two idlers, in such a way that the bar or tube is supported at three points, the necessity of guiding the bar by a stationary member is eliminated.

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A SEVEN-ROLL straightening machine for ferrous and nonferrous bars and tubes has been developed by the Sutton Engineering Co., Pittsburgh, featuring a design in which guides are eliminated. Guides always have a tendency to scratch and mar the material as it is being passed through the straightener, and, in addition, there is a high replacement cost due to wear. Elimination of guides is accomplished by grouping three rolls, one driven and two idlers, in such a way that the bar or tube is supported at three points as shown in the close-up view of the rolls.

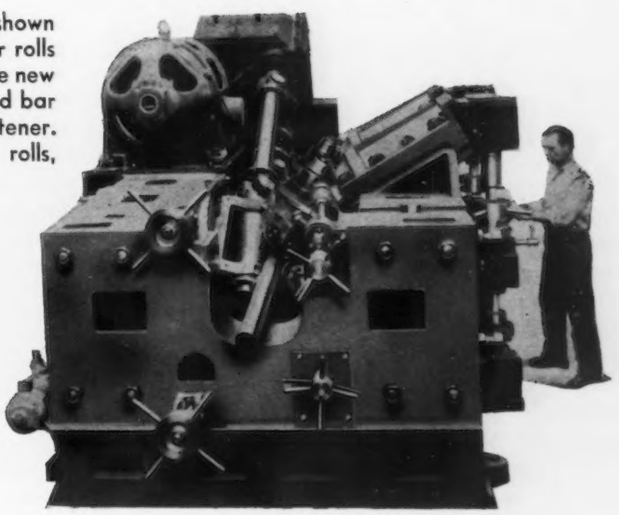
The complete machine consists of two groups of three rolls with an intermediate pressure roll. As in the Sutton five-roll bar machines, straightening occurs in the two sets of cross rolls as well as by using the middle idler roll. In addition to the elimination of guides, this grouping of rolls has other advantages. The time to change sizes is very short as it is only necessary to slip in the new size bar and bring the two idler rolls up against it by manipulating the pressure adjusting handwheels. The two idler rolls are tied together mechanically so that they come in and out along a fixed angle and always position the work in the center of the pass regardless of the diameter of the material.

On this machine, a wide range of sizes can be straightened without altering the angle of any of the seven rolls, also greatly reducing the set-up time; when angle adjustment is required it is a simple operation since all controls are on the outside of the machine. Separate handwheels are used to lock the angular adjustments with wedges. The use of wedges also makes it possible to relieve the pressure from the material without disturbing the adjustment in case a bar jams in the machine.

In the straightening of pipe and tube, the three roll group has a decided advantage in that the amount of ovaling of the tube is at a minimum. The machine is also well suited for the polishing of turned and drawn rod since the material contacts only highly finished rolls.

The machine is driven by a 50-hp. motor and will operate at speeds up to 500 ft. per min. The two large rolls are driven by means of universal couplings equipped with roller bearings, and all seven rolls are mounted on roller bearings. All gears are forged steel with cut teeth. The frame of the machine consists of four pieces keyed together at the corners and preloaded by means of large set screws.

THE workman is shown adjusting the idler rolls for size of stock in the new Sutton No. 2 KT round bar and tube straightener. Two sets of three rolls, with an idler pressure roll in between, do the straightening on this seven-roll machine.



Mold and Core Washes

° ° °

USE of salt and coal dust in blacking mixtures and the necessity for using a mechanical mixer when mixing dry bentonite with water were among the subjects covered in an interesting discussion of mold and core washes held at the recent Manchester Conference by the Institute of British Foundrymen. The discussion was inspired by the paper "Mold and Core Washes," by W. Y. Buchanan, which had previously been presented at the conference. Highlights of the discussion abstracted from a report published in the *Foundry Trade Journal*, London, are presented herewith.

Reference to coal dust in Mr. Buchanan's paper brought forth such questions as how long and in what manner was the coal dust mixed and what percentage of the coal dust was it possible to get into the blacking without frothing.

Mr. Buchanan replied to these questions by asserting that there was little or no frothing when coal dust was used in blacking; in fact, he did not know whether such an effect would be likely to occur. Personally, he had not noticed any, and the mixture appeared to be quite uniform and free from separation or even any form of frothing on the top. The length of time of mixing was not altered in any way by the addition of coal dust. The idea originally was that it might help to prevent the usual flaking off or blowing away of the dry black wash. What was hoped would result was a slight coking or fritting together of the coal dust at the usual stoving temperature.

He did not know whether it actually took place or not, but the blacking he was using was of a cheap quality, consistent with giving reasonably good results. A small addition of plumbago effected a slight improvement which might again be dependent upon the particular type of blacking, and might not apply when a more expensive type was used.

A foundryman asked how Mr. Buchanan added bentonite, and whether he preferred it to be dry before he added it to his mixture. The reason for adding bentonite appeared to be in order to keep the particles in suspension in the liquid, and by using a mixer the amount of bentonite in suspension was reduced.

If there was an addition of a thin oil to the blacking would it serve the same purpose? What would happen, when using a heavy composition wash in conjunction with a suitable mixer?

Mr. Buchanan said that dry bentonite could certainly be added to the water provided there was some form of pump or grinder incorporated in the equipment. He had not tried mixing with air alone. The process was certainly hastened if the bentonite was mixed preliminarily with water in a bucket, or at any rate made into a soft mud and thoroughly wetted.

Core oil of any type of linseed-oil base could be used to replace bentonite as long as it was borne in mind that the core oil might be completely burnt out at some of the stoving temperatures. At a high temperature bentonite was much better.

Another speaker inquired whether Mr. Buchanan adopted the new method of mixing blacking of the stiffer type. At some foundries with which he had been associated they had had to cast jobs in which they could not use liquid blacking; it had to be applied as a thick paste. Mr. Buchanan said he had not pursued his investigations to the extent of seeing what sort of mud could be added to a mixture of that type. If there was a strong pump in the arrangement he believed it could be done.

One foundryman pointed out that it was quite possible that in striving after cheapness in facing production Mr. Buchanan was adding to his costs in another part of the foundry.

It was not always advisable to strive after a cheap article when better and more economical results could be obtained by the use of a material the member said, which was a little more refractory and a little more calculated to carry out the duties required of it than the coke breeze which Mr. Buchanan assumed to be the best of all facing materials.

Mr. Buchanan said it had certainly occurred to him that it was possible to be penny-wise and pound-foolish. Unfortunately, he was responsible for both ends of the problem; the castings going out as well as the materials bought for the facings. Therefore he could not make a good showing in one department and put blame on somebody else in another. He had to shoulder the responsibility in both cases.

The question of whether the sand would peel away properly from the castings would very quickly be brought to his notice. Probably they would be in agreement that, no matter how good a blacking was, it would not get a proper chance unless it was mixed by some mechanical method which was free from the old troubles. It was certainly possible to get a good machine which would mix everything properly, but there were others which were not particularly effective.

A foundryman said he noticed that Mr. Buchanan had stated that the object of the bentonite admixture or that of core oil, dextrine, crude oil and Colbond was to prevent the blacking rubbing away after drying. Had he tried common salt for this purpose? It was probably a much cheaper method than using up core oil, etc.

Mr. Buchanan had not tried common salt, and would be rather scared of doing so unless he heard of someone else trying it first. The soda contamination of sand was one of the worst materials for reducing refractories. Salt might contaminate the floor sand for a long time, and then perhaps unexpectedly its refractoriness would be reduced and it would have to be renewed.

The questioner replied that he had tried salt water on a casting which cost about $1500 to make. It was as blue as any casting could ever be expected to be. The practice had now been introduced throughout the foundry and salt was a regular constituent of the blacking. The core-man could rub his jacket against the side of a mold and not rub off any blacking, he said, adding that he used an ounce or 1½ oz. of salt to a quart of water.

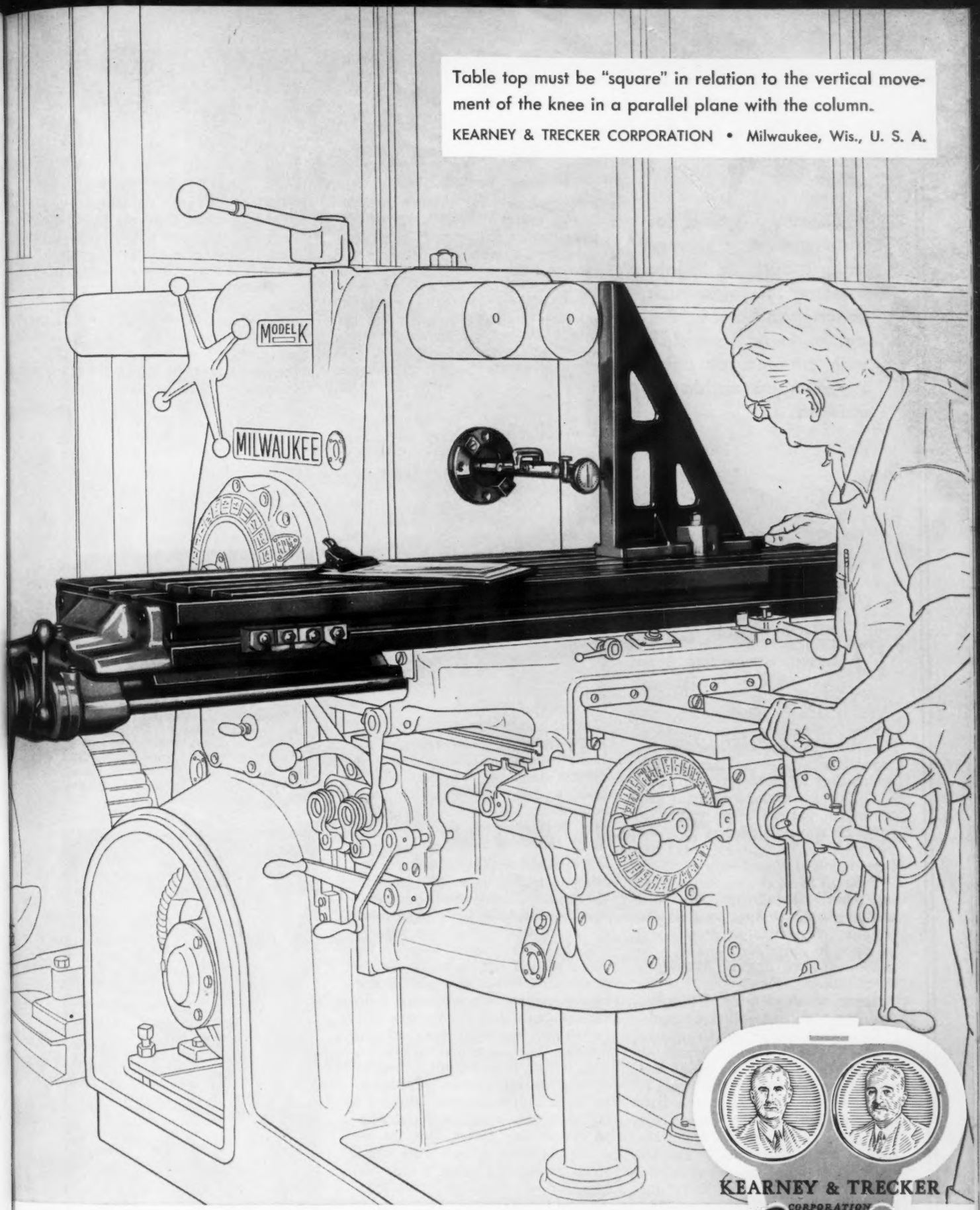


Table top must be "square" in relation to the vertical movement of the knee in a parallel plane with the column.

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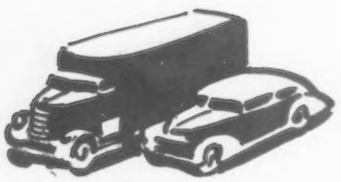
Assembly Line . . .

• February quota for auto industry follows pattern outlined in late Summer . . . Light truck is too valuable to the nation to be restricted with passenger cars, assert experts within the industry.



DETROIT—Following closely a pattern outlined late in the summer, OPM announced last week that the February quota for the automobile industry will permit assembly of a maximum of 174,122 vehicles, representing an overall reduction for the industry amounting to 56.1 per cent.

So far in this model year the prearranged pattern (the tentative schedule was published in the "Assembly Line" of Sept. 11, 1941) has been followed almost exactly. If it is adhered to as closely in the coming months, the March and April quotas should be the same as the one for February. Sharper cuts will be made in May, June and July to the lowest level, 122,977, in the latter month.

Again, as in October, OPM emphasized that availability of materials, not restrictions of the quotas themselves, probably will determine the future output. The trade has long recognized this as fact, and it seems especially likely to be true now that the Government has arranged to accelerate the manufacture of military trucks. That decision, mentioned here last week, jelled even before the words got into print. Word came from the War Department to Sidney Hillman, OPM labor director who was here on a visit, assuring that contracts would be placed soon for 94,000 trucks, at a cost of $200,000,000, with contracts for another 123,000 trucks, costing $230,000,000, to be placed after funds have been provided by Congress.

With total assemblies of passenger cars and light trucks limited to only slightly more than two million vehicles, the 217,000 Army trucks will swell plant operations and employment appreciably.

From within the industry has come a suggestion that the light truck is too valuable to the nation to be restricted willy-nilly with passenger cars, while heavy trucks are treated with priorities. The restriction probably was made by someone who mentally classified all light trucks with the orchid-and-cream colored delivery cars used by florists or cravat cleaners. This overlooks the fact that most of the half-ton trucks have "work" bodies on them. In rural areas, for example, about 80 per cent of the half-tons have pick-up type bodies, and the wheat harvest reportedly is handled in many cases by pick-ups—which, fortuitously or by design, hold the same amount of wheat as a combine.

Word comes semi-officially—after much rumor—that Washington has made recommendations that the industry study the elimination of de luxe models, heavy cars, special equipment, color options in paints, etc. Within limits, such ideas have merit, but how much is debatable.

Certainly, simplification and standardization make it easier for the manufacturer, and sometimes save considerable cost. And many of the "extras" offered on automobiles have been merely to please the customer and attract trade. On the other hand, compliance with Washington suggestions probably won't save much material. A convertible coupe uses somewhat less steel than a sedan (but not much, because the body weight is such a small fraction of the whole) and it might conserve labor (when that becomes a factor in this area) to standardize on fewer body types. But the defense program doesn't gain much when you stop calling a car "deluxe" or if you paint it black instead of red. Special equipment will be reduced, because clocks, radios, heaters and gadgets will be squeezed out of the picture sooner or later—some are already difficult to get.

PROBABLY the industry will agree without fuss, even to the proposals that some body types be dropped, but it is highly improbable that it will accept, without strong protest, any attempt to wipe out complete "lines" of cars, an attempt that is rumored as a likelihood. This plan would cause discontinuance of the manufacture of some or all of the "big cars," disregarding the competitive phases of the automobile business. The result would be a vast and perhaps permanent disorganization of the automotive competitive picture. There is not only the competition between Cadillac, Lincoln and Packard to be considered, for instance, but the intra-group competition such as that between Cadillac, Buick, Olds, Pontiac and Chevrolet, or between Lincoln, Mercury and Ford, or Chrysler, De Soto, Dodge and Plymouth. The latter type of

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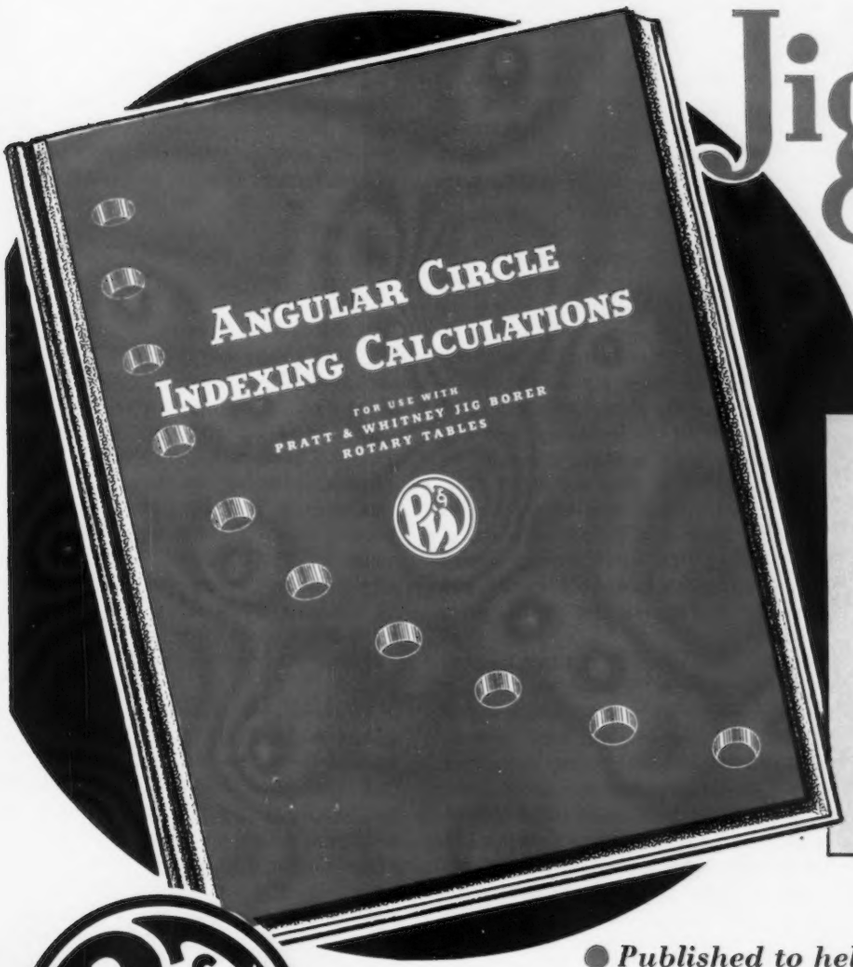
HALIFAX AT WARNER & SWASEY: Lord Halifax (left), recently visited the Warner & Swasey Co. plant at Cleveland. In the center is Charles J. Stilwell, president of Warner & Swasey, and at the right Louis M. Hackbert, lathe operator, who in 1910 taught Mr. Stilwell how to run a lathe.

Get more out of your Jig Borer



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PRATT & WHITNEY

competition is more keen than the casual bystander appreciates. If there is to be any virility in the auto business after the war, a reduction of "lines" must be avoided.

Unfortunately, it appears to us, Willys, manufacturer of the lightest full-sized car in the industry, happened to be the one to sponsor this thought that competitive "big cars" should be de-emphasized, and dreamy-eyed planners have been quick to promulgate the idea that GM should make only Chevrolets, Chrysler only Plymouths, and Ford only V-8's, or maybe Sixes.

Word filters through (and how true that is these days) that Washington probably will issue an order prohibiting model changes for 1943. This comes as an anti-climax, because no one in the industry even contemplates 1943 models, as such, and the major part of the industry is on record on that score.

There may be some easing of the bright work ban, before it becomes effective on Dec. 15. There will be two phases to the relief, one having to do with using up stocks already on hand, the other concerned with exemptions for certain types of parts.

According to instructions received early in the fall no bright work could be purchased after Oct. 1, but before that date arrived the industry had fabricated a lot of trim, in some cases possibly enough to last out the model year. The Dec. 15 ban, not announced until late October, was both a deadline, in the ordinary sense of the word, and a penalizing sentence, because officials thought that the stocking-up should be punished. At least the industry, or certain parts of it, have been given to understand that being caught with excessive stocks is "what it deserves."

As reported here last week, it seemed probable that some of the excess stock would be scrapped. Other plans also were afoot. Cadillac, for example, is selling trim materials to dealers, who will install it on cars, after retail sales, as an "extra". Now trade sources express the belief that a change in the ban will soon be forthcoming to permit at least another 15 days to use up some of the supplies on hand. (A 15-day over-supply might occur easily under the circumstances that now prevail in the industry, and the 15-day lee-way certainly could be justified). It is also rumored that OPM may permit use of stocks on hand if they are painted to cover the plating. In that event, many buyers of autos probably would get solvents to remove the paint, anyhow.

The other exception may be one to permit use of plating on certain parts such as windshield-wiper blades and arms, locks, lock covers, and others, where paint does not prove to be an adequate substitute.

When the ban goes into effect there will be many attempts to "beat the ban". One of these already taking shape is a tentative offer from small plating shops to strip a new car of all trim, and plate these parts for $20.

If the change-over from bright work is made as scheduled, the shutdowns appear likely to extend from Dec. 15 to Jan. 5, with the holidays added to the time required for the actual changes in lines and setups.

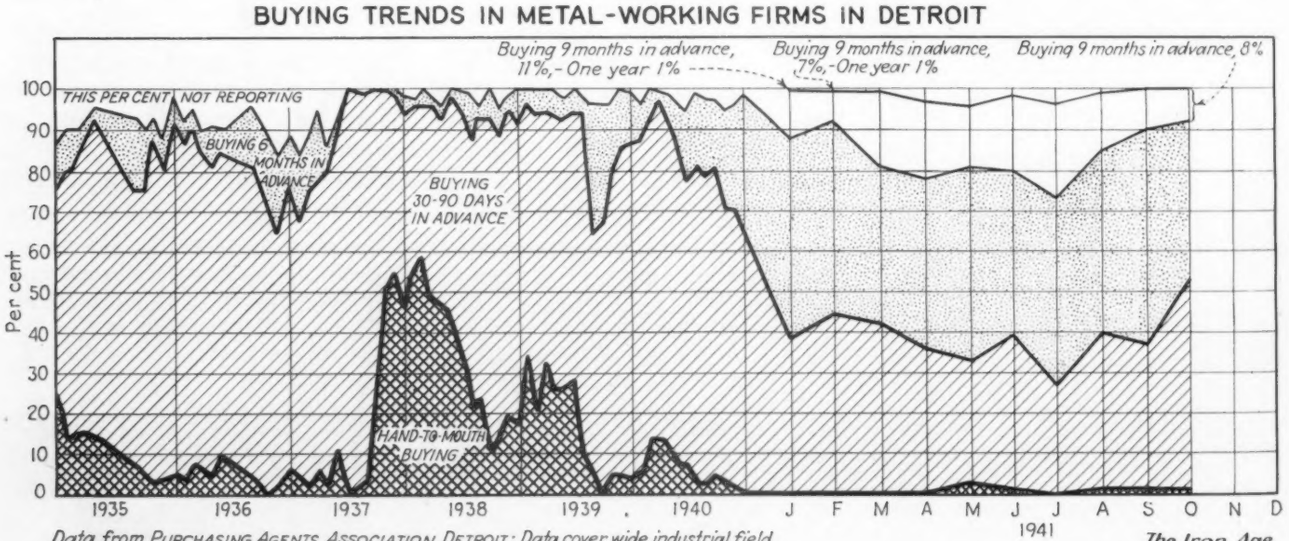
THE Thanksgiving holiday in Michigan and other early-observance States where there are auto assembly plants brought the week's total assemblies down to 76,820 cars and trucks, compared with 92,990 in the previous week and 104,440 in the corresponding week of last year, according to Ward's Reports, Inc.

The first of the Packard-built Rolls-Royce airplane engines—not off the assembly line until August—has been in the air, and now a fleet of Rolls-powered Curtiss fighters is on the way to completion. There will be 3000 of these planes, similar to the P-40 and designated P-40F, purchased at a total War Department contract price of $107,000,000, which possibly includes spare parts. Packard is making 9000 of these engines, with 6000 to go direct to the British for installation in planes in England.

Undescribed changes in these engines make them considerably different from the Rolls-Royce Merlin XX that was originally scheduled to be built by Packard. Design changes, which were taken in stride after Packard had begun its tooling program, apparently, give this powerplant extra performance at high altitudes. The critical altitude of the previous Curtiss fighters, Allison, powered, has been placed at

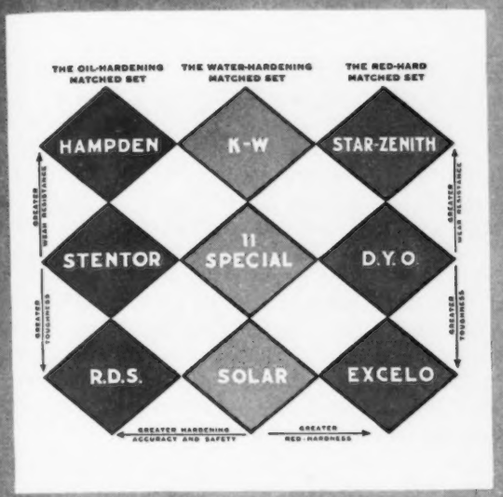
(CONCLUDED ON PAGE 93)

BUYING TRENDS IN METAL-WORKING FIRMS IN DETROIT



Data from PURCHASING AGENTS ASSOCIATION, DETROIT; Data cover wide industrial field, including stove, refrigerator office equipment, steel, auto parts, accessory, auto plants, etc.

The Iron Age



How Industry is getting

Improved Tool Performance with the *Carpenter* Matched Set Method

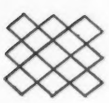
MORE than 1500 metal working plants are cashing in today on the benefits of this simplified method of tool steel selection. Results are in the form of faster tooling, increased output per tool, and added capacity of tools and presses.

In 1935 the Matched Set Method was a revolutionary new idea—just as many other Carpenter developments have been—but quickly the idea "caught on" with the men responsible for tools. As more and more of these men discovered how tool performance could be improved—they began to adopt this new method in their tool rooms. Soon it became generally recognized that fewer tool steels *properly matched* could take the place of the hundreds of types formerly used.

Today, the Carpenter Matched Set Method is the standard pattern for simplified tool steel selection. But it has taken more than a pattern to achieve the outstanding results that are continually being credited to Carpenter Matched Tool Steels. *Four* important Carpenter developments each contribute their share to maintaining these results. (Note the four at the left.) Even under the pressure of national defense requirements, and greatly expanded mill facilities, Carpenter's vigilance over these safeguards has not been relaxed. We know, and you know, that only the best tool steel is good enough for defense needs.

BEHIND THE METHOD ARE THESE 4 CARPENTER DEVELOPMENTS

Matched Tool Steels



So called because careful control of properties allows each steel to dovetail with the other, picking up its job where the other leaves off. It is because they are ***properly matched*** that the Carpenter Matched Set Method work so successfully.

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Carpenter
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TOOL STEELS

Washington . .

• New allocation plan looks like a complicated procedure for developing requirements for each industry . . . Much time will be required to get the entire program into effect . . . Industrial branches will be responsible for each class of requirements.

WASHINGTON — Operation of the broadened system of allocation in the steel industry is being awaited with interest. Stanley B. Adams, Assistant Chief of the OPM Division of Applications, has said that it is not the intention to attempt a total allocation of all products but only to control those products which are most vitally needed for defense. Even in this control, it is proposed, Mr. Adams said, to keep it specifically to defense customers, and allow any excess other than defense whenever possible to flow through its natural channels.

The approach to the problem shown by Mr. Adams, as stated at the OPM-industry wide meeting on Armistice Day, met with approval. He said that the job requires teamwork.

"It needs the help, advice and counsel of the whole industry," he pointed out. Steel executives had in similar terms made the same observation. They were given an OPM promise of better coordination of its work to meet the industry's complaint of upset production schedules through Government interruptions.

ONE of the points steel executives had in mind were the disruptions of schedules that have occurred in relation to allocations on their present small scale. Seeing an expanded allocation plan ahead of them they have manifested concern that, unless there is better coordination of its work by OPM, these disruptions will be greatly magnified with a consequent loss of large tonnages.

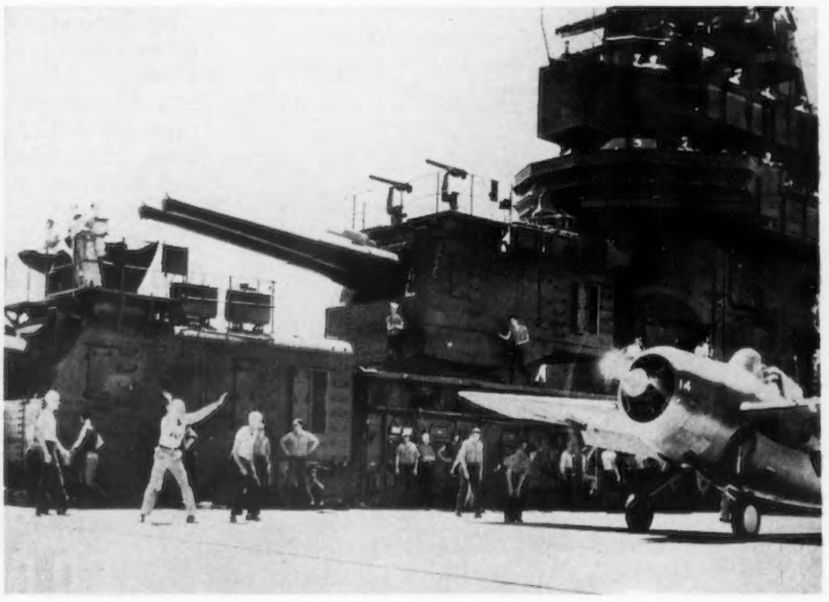
For one thing complaint has been made by the industry of small hurry-up orders that should not have been placed direct with the mills but should have been obtained from other sources, such as warehouses. Loss of tonnage has been the inevitable result of making the necessary changing of rolls, the effect reaching from the finishing back to the semi-finished departments. It is clear therefore that unless consideration of these factors is taken into account a wider-scale allocation program would mean heavy cuts in production and general confusion. Kicks for some time have been prevalent.

IN turning to the allocation system, SPAB has set up what looks like a complicated system of procedure for developing requirements for each industry. An industrial branch is responsible for each class of requirements. SPAB concedes it will take a great deal of time to get the entire program into effect.

As a starter, every application for preference rating (PD-1), effective Dec. 1 will be routed through a series of OPM branches, beginning with the industrial branch handling the product manufactured, or the service rendered by the applicant. This branch then will review the importance of obtaining the product, indicate the date for delivery and the preference rating. After the application makes the hurdle it goes to the branch handling the product "for which the applicant's product will be used and to those branches handling the required materials," to use the not-clear statement of SPAB. Then the next jump comes. The branch responsible for the material, "if satisfied with the recommendation of the initiating branch, shall transmit the application to the priorities division for final review."

SOMETHING in the nature of arbitration or mediation or whatever it may be called, then appears on the winding course. For, SPAB pointed out, "if this branch is not satisfied with the recommendations, an effort will be made by the branches involved to reconcile their differences." Finally, "if common agreements cannot be reached, the application, together with the recommendations of the branches

TAKEOFF AT SEA: A signal officer aboard a U. S. aircraft carrier gives the "go" sign to a fighter plane about to take off from the flight deck.



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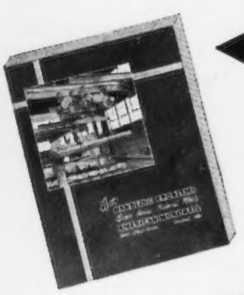
Regardless of the type of business, there is a system suited to your problem. Standard parts are assembled into complete systems to meet the special requirements of the particular jobs.

If you are "up in the air" about materials handling, let an American MonoRail Engineer show you how to handle material "in the air". Definite recommendations will be made and a detailed plan submitted without cost or obligation.



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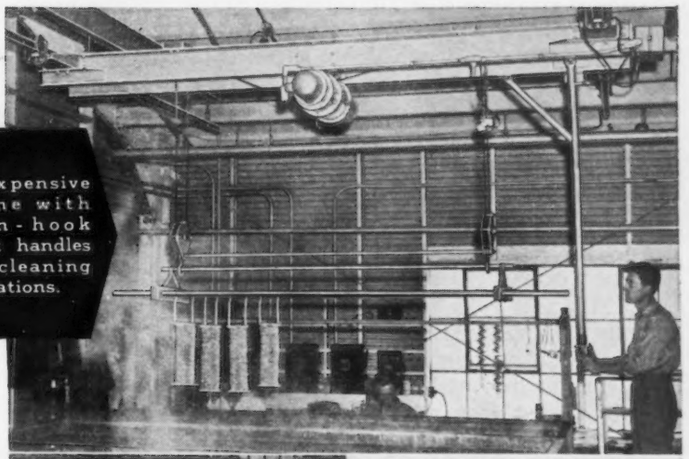

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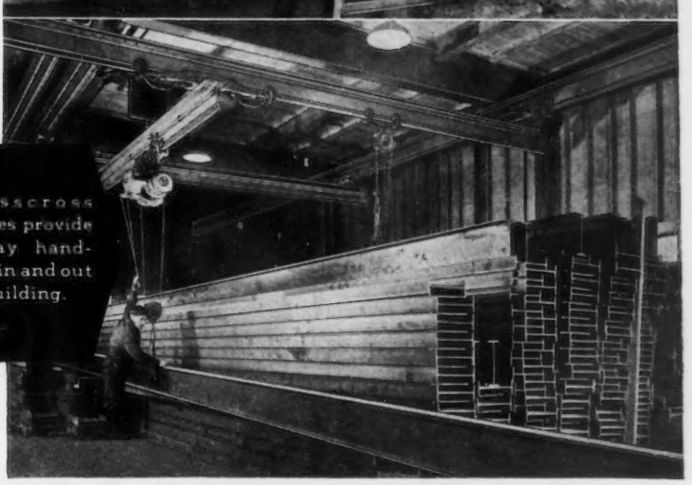
Special retractible crane over driveway saves $600 each year.



Crisscross cranes provide 2-way handling in and out of building.

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involved, shall be forwarded to the priorities division for final determination of the rating to be assigned." Unless the system works much more simply than its explanation sounds, it looks as though it is going to take a long time before the steel or other material is scheduled for production, and that hardly accords with OPM's "Time is Short" slogan, though John L. Lewis already has given the slogan a big sneer.

In any event the allocation system has been determined upon and the cooperation of both government and industry is deserved and no doubt will be given in an effort to make it work.

MR. ADAMS said that the success of the system applied directly to the iron and steel industry will depend upon starting from a point where the industry is in balance. By this he means that in the distribution of raw materials or semi-finished steel to the available finishing capacity both integrated and non-integrated steel plants should "share and share alike."

"The first obligation of those producers which in the past have been the primary suppliers of semi-finished steel shall be toward their original customers. We are going to apply the principle of allocation to the cold-finished industry within a few weeks."

Mr. Adams said that of the two parts of the mechanics of the program the first, that of placing of orders for large blocks of products for shipment over a given period of time, is a relatively simple job. There has been a great deal of this kind of allocation. Not so simple, he said, will be the operation of the second part of the system, which so far has been applied only to pig iron and plates for which monthly quotas for consumers are placed with mills. Speaking of the broadened plan, Mr. Adams explained that the second part will not be simple because the total amount of steel allocated for delivery or production in any one month with all companies "may be far in excess of the amount of steel which they can produce.

"Then the problem arises," Mr. Adams declared truly, "as to what orders for what customers are to be produced or shipped in any one month in preference to all other customers whose requirements should be filled within the same period of time."

As an attempted solution of the problem the Iron and Steel Branch will require manufacturers to submit complete production schedules of given products and then they will be advised "specifically as to what they shall produce for a certain product and its customers."

THE BULL OF THE WOODS — BY J. R. WILLIAMS

HERE, MY MAN, YOU'RE NOT DOING ANYTHING FOR THE MOMENT! RUN OVER AND TELL THAT FELLOW IN THE GRAY SUIT TO COME HERE!
THAT SHOWS YOU HOW TH' GOVER'MENT IS CHANGIN' THINGS--TH" OL' BULL OF TH' WOODS HAS BEEN OFF TWO DAYS WITH A COLD AN' THAT NEW GOVER'MENT MAN THINKS HE'S A DESK DUSTER ER SOMETHIN'!
WELL, HE'S LUCKY HE WASN'T OFF THREE DAYS! HE'D HAVE TO DIG UP HIS BIRTH CERTIFICATE TO GIT IN HIS OWN SHOP!
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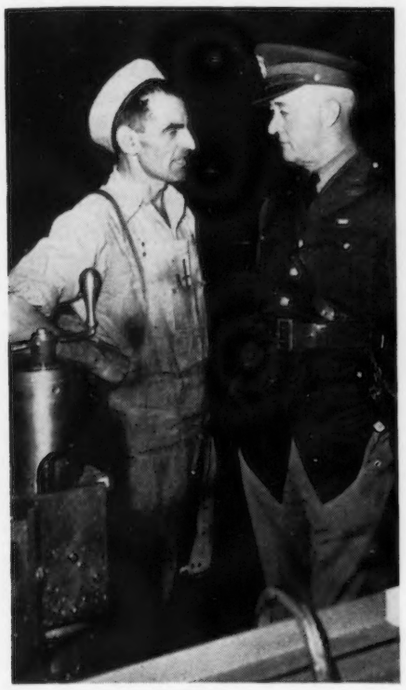
THE STRANGER
J.R.WILLIAMS 11-28

Auto Firms Face Possible New Cut

Washington

• • • **Increasing** defense demands for steel and other critical materials may require a reduction greater than 56.1 per cent in passenger automobile production ordered for February, 1942, as compared with February, 1941, according to OPM Civilian Supply Director Henderson. He said there is no guarantee that sufficient materials will be available to meet maximum production allowances in any consumers' durable goods field.

For the first seven months of the 1942 model year, from Aug. 1, 1941, to March 1, 1942, maximum production will be 1,402,187 cars, compared with 2,325,038 cars produced in the corresponding period of 1940-41, or an over-all reduction of 39.7 per cent. According to the program announced by Henderson Aug. 21, a curtailment of at least 50 per cent for the full model year ending July 31, 1942, will be achieved. A reduction of 26½ per cent was ordered during August, September, October and November, 48.4 per cent in December, and 51 per cent in January, 1942. Under the February plan, the larger companies—General Motors, Chrysler and Ford—will be curtailed at least 59.3 per cent below output this February. Proposed overall reduction for the smaller concerns — Studebaker, Hudson, Nash, Packard, Willys-Overland, and Crosley—is 15.7 per cent.



BOTH ARE SOLDIERS: Frank Joyce, skilled member of the wing assembly department at Douglas Aircraft Co.'s plant and Brig. Gen. William O. Ryan, 4th Interceptor Command, are talking over the problem of turning out attack-bombers, dive-bombers, military transports and night fighters for the U. S. A. air forces and the RAF.

Tin Cans as Scrap Shunned by Canada

Ottawa, Ont.

• • • **Acknowledging** the public response to his recent appeal for iron and steel scrap, F. B. Kilbourn, steel controller of the Department of Munitions and Supply, Nov. 16 reiterated his warning that used tin cans are economically unprofitable as scrap.

"They are worse than useless as scrap because of the many difficulties they present," he said. "These include transportation troubles owing to bulkiness or to the treatment of compressed units, if the tin cans are pressed before shipment; the removal of tin and solder from the cans; and the disposition of detinned scrap which contains at least 0.1 per cent tin.

"It is essential, therefore, that no coated or enamelled wares be turned in as salvage. But old stoves, automobile parts, tools, machinery, and similar articles are acceptable."

War machines and munitions have to be good to stand up under war conditions. They must be made rapidly in huge quantities by a variety of plants. All parts must be strictly interchangeable.

Hence the task of guarding quality becomes a matter of life and death importance to a nation rearming to preserve its liberty.

Sheffield Visual Gages are stalwart guardians of dimensional quality. They are used in checking dimensions of manufactured and purchased parts, tools, production and master gages.

The sturdy Reed Mechanism, combined with the light beam lever arm, provides a sensitivity to meet the highest precision standards of measurement—but without the delicate fragility so often associated with sensitivity.

These gages are not delicate, they are strong and deadly accurate. They are made in various models to check accurately to thousandths, "tenths" or millionths of an inch and all provide rapid, easy gaging to any limits required on production work.

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WEST COAST . . .

• Incentive for new mines needed for strategic defense materials is discouraged through failure to exclude them from excess profits tax under the new revenue act . . . Negotiations under way for new shipyard at Los Angeles for Western Pipe & Steel Co.

SAN FRANCISCO—Failure to exclude mines producing strategic minerals from the excess profits tax under the new revenue act has already discouraged at least one large mining firm from undertaking a new venture of this type. Producers of strategic minerals were excluded from excess profit taxes during 1940, and the new bill, as passed by the Senate, also excluded them. The House, with few representatives understanding mining problems, and the joint House-Senate committee, which ironed out differences in the bill, brought back strategic mineral producers under the bill, and thereby deprived this country of what hope it might have had of more nearly fulfilling its needs from domestic ores. American strategic ores are nearly all low grade, with little incentive for development because of the uncertain duration of the emergency and high development costs involved. As taxes mount, the grade of ore which is required to provide a financially successful venture also mounts.

The theory of mining capital is that the many hazards incident to the development of strategic minerals deserve a high reward. Thousands of dollars may be spent in prospecting and development work at a series of mines without any return whatsoever; a tax burden of over 70 per cent on the mine which finally does pay off keeps the whole string of enterprises in the red rather than pulling them out of the hole. As applied to the mining of strategic minerals, the new excess profits tax will not produce revenue if incentive has been thus destroyed. That it has been thus destroyed now seems to be a matter of fact rather than conjecture.

Figures showing that the RFC has committed itself to the purchase of nearly a billion dollars of critical materials represent merely a framework of possible production. Many production contracts have been entered into on a unit price basis, and it now develops that many contractors have no concrete idea of where they will find the ores to fulfill their contracts. To mining interests not under contract, even a substantial price raise would prove of doubtful value in stimulating production if the discouraging tax structure is unchanged.

NEGOTIATIONS are cooking hard by which Western Pipe & Steel Co., which maintains fabricating shops at South San Francisco, Fresno, and Los Angeles, and a shipyard at South San Francisco, would establish a second shipyard at Los Angeles Harbor. Western Pipe has undertaken many of the West's large plate fabricating contracts, including penstocks for Grand Coulee and Shasta Dams and much of the Metropolitan Water District's huge aqueducts leading to Los Angeles. Through an affiliate, it formerly built many tank cars.

At the beginning of the emergency, Western Pipe was one of the first to rehabilitate shipbuilding facilities at South San Francisco, adjoining its fabricating shop, and obtained a contract for five Maritime Commission C-1-B merchant vessels under the long range program. This spring, the yard was enlarged, and another contract undertaken for a large number of C-3 vessels. Meanwhile, the large Los Angeles shop has been working on ship boilers and components. Establishment of a shipyard at Los Angeles Harbor, coordinated with shop facilities, would probably allow Western Pipe to get into production faster there than another builder having to start from scratch. Although the harbor is several miles from the shop, a key to the shop value is furnished by Consolidated Steel Corp., nearby, building ships under similar conditions.

Repercussions of the recent strike of indepedent welders in coast shipyards were heard last week as President S. D. Bechtel of California Shipbuilding Corp., Los Angeles Harbor, told spectators and employees of his firm gathered to watch the launching of a new "Liberty ship" just what the strike had meant to them.

"This would have been the fourth ship instead of the third provided by us for the United States emer-

VEGA VENTURA: This large, fast bomber is being manufactured by the Vega Airplane Co. for the RAF.

They all point to HYDRAULIC DRIVES

Any job on which the use of high speed internal combustion engines demands the repeated starting of heavy loads . . . or an excessive amount of gear shifting to accommodate varying load conditions is a typical job for the Twin Disc Hydraulic Drive. Case studies on hundreds of working examples, in a wide variety of applications, are now available to any engineer who is planning to take advantage of the definite trend to hydraulic drives—either a Hydraulic Torque Converter or a Hydraulic Clutch. Ask for Bulletin 132 or write the Hydraulic Department for definite recommendations.

ILLUSTRATED: *Left, Hydraulic Torque Converter and right, Hydraulic Power Take-off.*

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES
REG. U. S. PAT. OFF.

TWIN DISC CLUTCH COMPANY, 1370 RACINE STREET, RACINE, WISCONSIN

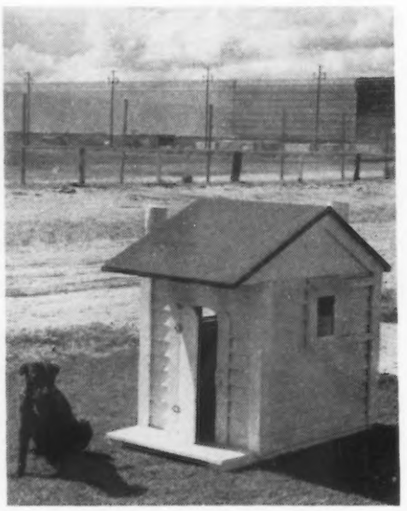
gency effort, if it had not been for the totally unnecessary welders' strike," he said. "That strike cost the United States exactly one ship. It was a situation that never should have happened. At no time was there any trouble between the employees and the company. It was a matter that should have been settled among the employees themselves without the sacrifice of something so urgently needed as one good ship at this time.

"We'll try to catch up on the rest of the ships we build, but you never know if you can catch up when you are already straining every effort."

NO Pacific Coast shipbuilding executive will be able to address CIO coal miners, but the effect of this strike will be no less severe here than 3000 miles away where it occurred. Probably never before has the effect of a strike been felt so directly at such a distance. With Eastern mills rolling most of the steel being used in Western shipyards the impact is stunning.

The first defense production clinic to be held on the Pacific Coast drew 6500 people representing 4000 concerns to Los Angeles last week. A similar clinic at San Francisco was scheduled for Monday and Tuesday of this week. More than 2000 contacts were made by the 72 prime contractors and government agencies exhibiting with the view of later working out subcontracting arrangements, although few were actually completed at the clinic. This clinic was regarded as particularly important in that it was located in the heart of the large aircraft production area, and in a region in which small metal working firms are abundant. The Los Angeles office of the Division of Contract Distribution expressed complete satisfaction over the result.

Further encouragement was given to small Southern California manufacturers in an announcement by the Aircraft Parts Manufacturers Association, composed chiefly of manufacturers of parts and components supplying airplane builders, that several of its larger members were planning to bid on "big contracts and distribute the work among smaller processing companies not now engaged in national defense work." The prospective new contracts, it was said, would not decrease present aircraft parts production, but would, rather, increase it through more subcontracting.



BOMBER ANNIE: This doghouse, occupied by Bomber Annie, a mongrel known in the Southwest as the mascot of construction workers at the Fort Worth, Tex., aircraft assembly plant, is the only permanent building at the plant with a window. Production of Consolidated B-24's will begin at the Fort Worth plant in July.

Speaking before the Aircraft Parts Association, Thurman Arnold reiterated his declaration that the Justice Department in no way opposes production pools of small manufacturers. He declared that, instead, the antitrust division would extend all aid to plans designed to keep the "little man" in business during the emergency.

In visualizing personnel problems of California aircraft manufactures it is important to take into account the preponderance of youthful workers. In the North American Aviation plant, for instance, which experienced serious strike difficulties a few months ago, 15,000 persons are employed. Of that number approximately 75 per cent are 30 years of age or under, and of this group more than 50 per cent are between 19 and 26. Recruited from all parts of the country, a labor force of this type has none of the hereditary grievances common to older industries, but it does have the outlook of a younger generation educated to accept collective bargaining as a matter of course. North American's President J. H. Kindelberger spoke straight from the shoulder at a recent meeting of department heads when he said: "Let's remember one thing: someone else will keep 'em flying—our job is to get 'em built."

Free Foundry Courses Sponsored by Rutgers, AFA

Elizabeth, N. J.

• • • **A series of tuition**-free foundry instruction courses will start here Nov. 24 under the joint sponsorship of Rutgers University and the Metropolitan Chapter of the American Foundrymen's Association, according to D. J. Reese of International Nickel Co., chairman of the chapter's educational committee. The courses to be given are "Metallurgy and Metallography of Cast Metals," "Melting of Metals in the Foundry" and "Foundry Materials."

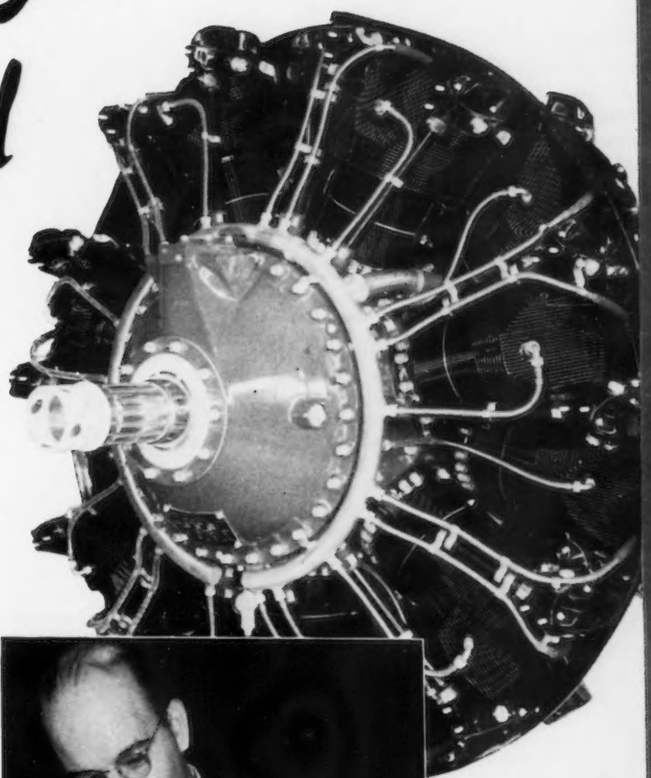
Each course will be held one night a week under the direction of specialists in various fields. The program is designed to provide an increased supply of skilled foundrymen for the area. Application blanks and other information are obtainable from the Engineering Defense Training Department, Rutgers University, New Brunswick, N. J.

Rebuilding of Machine Tools Told in Simmons Brochure

• • • **Engineered rebuilding** of used machine tools is told in an illustrated 58-page brochure recently issued by the Simmons Machine Tool Corp., Albany, N. Y. After reviewing the history of the company over the past 30 years and describing the production facilities of the present enlarged plant, the bulletin goes on to show how old machines can be modernized by the adoption of a variable speed drive unit known as the Micro-Speed drive and by application of power rapid traverse. A number of other interesting conversion jobs are also described and illustrated.

The bulletin, which is bound in loose-leaf form, concludes with a catalog section of new machine tools made by the company, including engine lathes, turret lathes and milling machines.

WHEN *Life hangs on a thread*



LIFE OF AIRCRAFT engines—service life, and only too frequently also the life of pilots who fly behind them—depends greatly on the accuracy with which such engines are made. Nowhere is production "inspection" carried farther than in the industry which builds engines for our fighters, our bombers, and our transports—engines that are required to develop as much as a horsepower for every pound

Above: Wright Dual Cyclone Aircraft Engine

Left: Checking crankshaft threads for a Dual Cyclone

Here you will find X-rays to look inside vital parts to determine whether the metal is sound throughout . . . magnetic instruments which disclose surface flaws so minute that the eye cannot detect them . . . other devices so sensitive that they will reveal surface irregularities of a millionth of an inch.

And widely used in this industry, too, you will find "Detroit" thread gages to check on the accuracies of "threads on which life may hang": threads for connecting rod bolts and nuts, threads for cylinders and cylinder heads, threads for crankshafts, internal threads and external threads of all kinds.

"Detroit" thread gages, plug and ring, are not built to a price. They are produced, first and last, to meet the most exacting of inspection requirements. That they are so low in cost is due solely to manufacturing ingenuity, including the use of production equipment specially designed and developed by *Detroit Tap* to produce, in quantities, thread gages of "master" accuracy and high resistance to wear.

We will be glad to send you a catalog showing not only the line of "Detroit" thread gages, but also *Detroit Tap's* other products: standard and special taps and thread production tools.

DETROIT TAP & TOOL *Company* 8432 BUTL DETROIT

Fatigue Cracks

BY A. H. DIX

Alice In Scrap Land

• • • Miss Emily Johnson's suggestion, recently aired here, that old letter-copying presses be collected to help relieve the scrap shortage, brings this from Edwin C. Barringer, executive secretary of the Institute of Scrap Iron & Steel:

> Miss Johnson has something. The kind of scrap she would make available is comparably better than baby carriages, lawn mowers, electric fans . . . that have been attracted out in some of these household campaigns . . . Cast or wrought iron scrap is becoming as valuable as diamonds.
>
> The problem is one of collection because it does not pay a dealer to send a ten-ton truck to pick up a letter press or other isolated pieces of scrap. But if Miss Johnson or the owners of these antique letter presses will take them to any Institute member, the latter will be glad, I am sure, to pay Mr. Henderson's ceiling price, minus freight to the nearest basing point, minus $2.50 per ton for preparation . . .

Which reminds us of Mark Twain's visit to a bookstore. He asked the price of a certain book and said he supposed he would get the usual author's discount. The clerk nodded yes. Twain then said he believed he was also entitled to discounts as a publisher, a teacher, and a public speaker. The clerk agreed. "How much then," asked Twain, "will the book cost me?" The clerk did some rapid calculating and announced, "The way I figure it, if you take the book we owe you 75c."

Foreigners Are Funny People

• • • Tell an English woman she is homely and she is pleased. The same word frequently means one thing here and something else in Europe. For instance, Edgar Allen & Co., Ltd., the Sheffield tool steel maker, devotes a page ad to glorifying a photograph labeled "The Striker," an unthinkable use of advertising in this country. But there the striker is simply a man who swings a sledge.

And the Netherlands Purchasing Commission writes:

> Your priorities exposé has been praised very much. Could we get another copy?

Exposé may have a general application in Europe, but here it has acquired a definitely unpleasant, even sinister, connotation, indicating that exposés in this country have been confined largely to situations without virtue or merit. Therefore, we prefer that the highly popular priorities guide be called, if anything, an exposition.

Incidentally, this issue contains the latest and largest edition of the guide—a 12-page separate section. You will find it herein unless someone beat you to it. Extra copies are obtainable at these prices:

1 to 10 copies	25c each
11 to 100 copies	20c each
101 to 300 copies	18c each
300 or more copies	15c each

In order to keep the scowl off the face of our bookkeeper will you kindly send stamps or coin with orders for less than a dollar.

Joke

• • • Jim Rowan, our news and markets editor, heard this at a meeting the other day:

> *Two fishermen who had been drinking generously caught many fish in a certain part of a large lake. "We should make a note of this spot," one of them said. "We should indeed," said the other, proceeding to make a large X in chalk on the side of the boat. "That will do no good," said the first. "The next time we may not get the same boat."*

Insomnia Inciters

• • • A Detroit firm name we keep wondering about is the Butt Welding Co. Does it do nothing but butt welding or is the owner a man named Butt? Another name that always stops us in our tracks is that of the Wm. Bros Boiler & Mfg. Co., Minneapolis. Whenever we see it we mentally put a period after Bros. as if it were an abbreviation for "brothers." But it isn't; it's just Bros.

Misfired Aptronymic

• • • Speaking of names, the other day a letter came in from a firm that publishes the English *Refractories Journal* and *Claycraft*. The secretary of the firm is named J. F. Dunk, and we thought how neatly he would fit into the executive set-up of the Doughnut Machinery Corp. of America.

Kick and Compliment

• • • A nice letter came in the other day from R. G. LeTourneau, the big earth-moving equipment manufacturer. This is the man who was successively a molder, farmer, garage owner, and land-leveling contractor. Needing a scraper, he built one, and now heads an $18,000,000 corporation. He writes:

> The Iron Age is one publication that I read from cover to cover, and each Friday I watch for the magazine as I generally find time to read it over the weekend.
>
> Ordinarily it is received here in Peoria on Friday but occasionally it doesn't come in until Monday . . . I am listing below the dates we have been receiving it for the past several months . . .

Of the 29 issues he lists, eight were late. In four instances the delay was due to holidays; we were at fault in one case, as a particularly big issue was a day late in getting off the press. That leaves the post office to blame for the other three. We have squawked to the right people.

If your copies ever come in late we wish you would let us know, so that we may investigate, as we think our system of routing THE IRON AGE is wonderful.

Cable Style

• • • Someone sent us a copy of the little house magazine the LeTourneau people get out, entitled "Now." An abbreviated telegraphic style enables "Now" to pack more information into a line than anything we have seen outside of a cable code book. Sample items:

> **Hosp: Earl Schertz, nite TP case welder, to Methodist 10/3 for appendectomy; Carl DeBolt, Rooter welder, to Methodist 10/5 for appendectomy; Lloyd Eichorn, blades, to Methodist 10/1 from auto crash. . .**
>
> **Briefs: Construction Foreman Dave Lewis & crew 10/1 bulldozed road thru underbrush to Greyhound bus which went over 30' bank on #13 in S.C. 10 miles from plant, snaked it out, refueled, bus continued to Atlanta.**
>
> **Born: Paul Francis 7# 4 oz. 10/2 at Pekin Hosp., son of Orville Boyer, nite chainman #2; Jo Ann 8# 14 oz. 10/5 at St. Francis, dau. of Joe Fennell, nite G & L machinst #2. . . Standards hi man wk. 9/27 Clarence Jarrett, cutter, 1255 prem. units; hi dept. nite clean & paint (Foreman Clem Hosea); most improved nite Sheeps Foot Roller (Foreman Paul Malone). . .**

Paper Saver

• • • With talk of a paper shortage, tight writing may become obligatory, so we will try our hand at it:

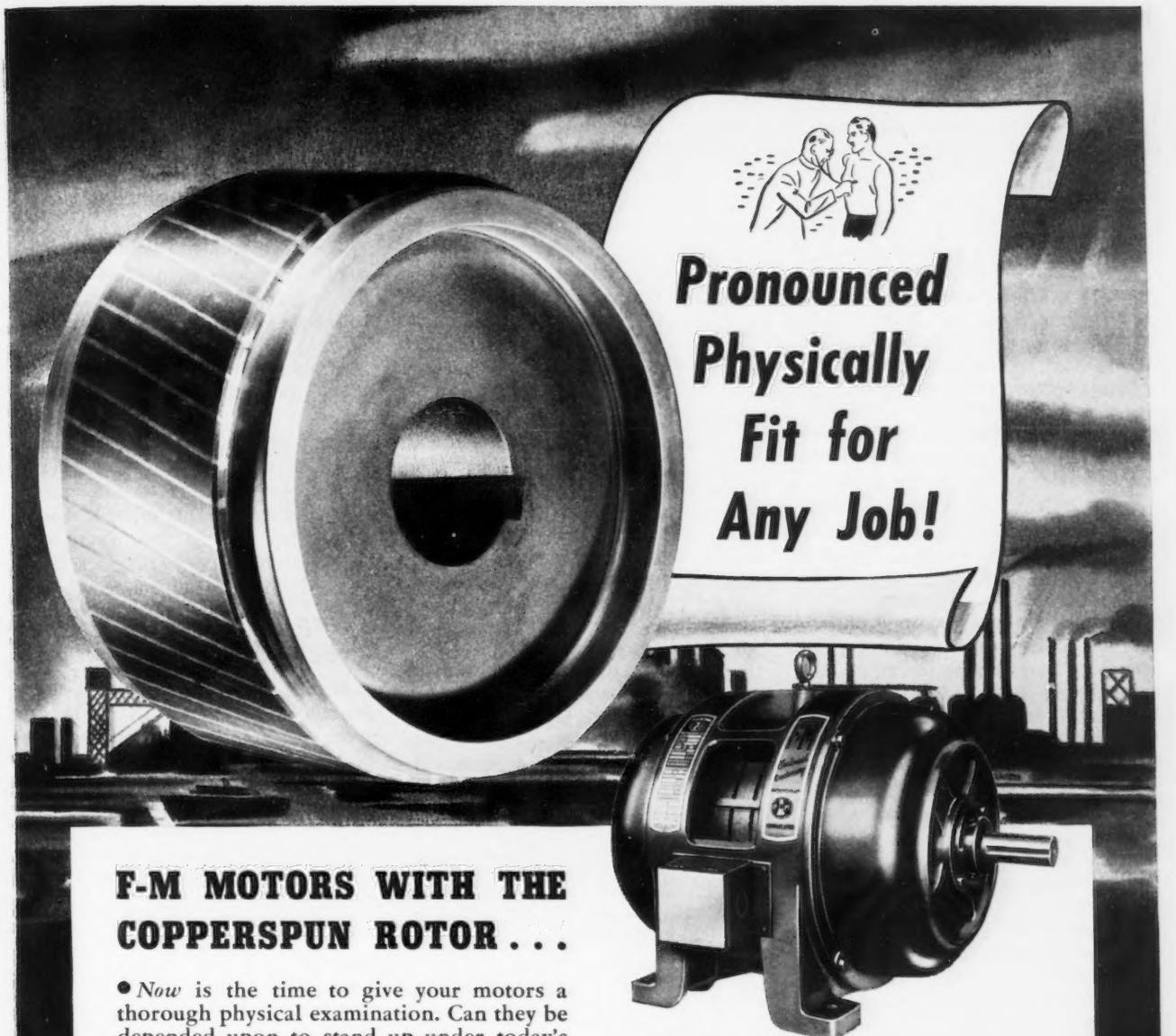
> Inf. pl. cond. Fadiman pronounces *data* d'tta. It's still day-ta, Cliff . . . *"Arco-Rollaway Skate Co. is in Marathon, N. Y. Appropriate, what?"*—Van. . . . Your f.f.j.'s total subs this wk. crost 17,000 mark. New a.-t. high . . . Simmons Machine Tool Corp., mch. tool rebuilder, calls self *Mechanical Mayo Clinic. Apt.* . . . Sign on L.A., Cal., milk wagon, *"Our cows not contented; always striving to do better."*—R. R. Kay . . . Hero of Bkln shellac factory explosion named A. Painter. (Thanks, Chas.)

Puzzles

• • • Last week's cow has a 100-ft. rope.

If your coffee is cold before you have solved this you get only a C:

> *A small plot has the shape of an equilateral triangle. The area of the field is the same number of square feet as there are yards in the perimeter. What is the length of a side, and what is the area of the field?*



F-M MOTORS WITH THE COPPERSPUN ROTOR . . .

● *Now* is the time to give your motors a thorough physical examination. Can they be depended upon to stand up under today's greater demands? Find out *before* they fail . . . *before* they cause expensive delays.

Then *compare* your motors with Fairbanks-Morse Motors having the *Copperspun* rotor. These F-M motors set a new standard of performance . . . a standard that's in tune with today's production tempo.

They are unrivaled in ability to stand up under the most severe plugging and reversing service. Why? Because they are the *only* motors having rotors with windings centrifugally cast in one piece of SOLID COPPER.

And the characteristics of copper make it the ideal rotor material. Copper has high electrical and thermal conductivity (twice as good as aluminum), greater strength, and low thermal expansion.

If dependable power is important to your operations, investigate these superior motors now. Write Fairbanks-Morse & Co., Dept. K38, 600 S. Michigan Ave., Chicago, Ill.

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FAIRBANKS·MORSE MOTORS

DIESEL ENGINES ELECTRICAL MACHINERY RAILROAD EQUIPMENT WASHERS-IRONERS STOKERS
PUMPS FAIRBANKS SCALES WATER SYSTEMS FARM EQUIPMENT AIR CONDITIONERS

This Industrial Week . . .

o o o

ENDING of the coal strike stopped the latest threat to continued production of steel for the defense program and for civilian use but the issue over which it was called—the closed shop in the steel company owned mines—still had not been settled at midweek.

The strike had chalked up another production loss against the defense program, the loss in ingot output in the Pittsburgh area alone being 21,000 tons. It had developed widespread public indignation against the use of the defense program to increase the power of the mine union and had brought another shift in the relative strength of some union leaders, with Philip Murray, president of the CIO, gaining and John L. Lewis losing.

CIO Refused Mine Strike Support

Some observers credited Murray with playing a strong part in ending the coal strike. Others believed that Lewis himself saw the dangers of continuing an all-out battle for the closed shop at this time. It is significant that the CIO Detroit convention refused to support a UMW motion indorsing the strike.

Since various angles of the closed-shop-in-coal controversy had already been threshed out, predictions were being made at midweek that the new arbitration board, consisting of B. F. Fairless, president of United States Steel Corp.; John L. Lewis, president of the United Mine Workers Union, and Dr. John R. Steelman, public representative, would act swiftly. Since Steelman was to cast the deciding vote, all parties concerned were examining his record as a clue to his vote for or against forcing the closed shop on the mines.

"You can't decree cooperation," Dr. Steelman is quoted as saying. "You can't do it any more than you can legislate peace or harmony."

Beset from all sides by work stoppages, schedule interruptions, overdoses of priorities, scrap and pig iron shortages and other retarding factors, the steel industry this week felt more than ever that it was doing well in keeping steel production so close to capacity.

Allocation Spreads in Steel Products

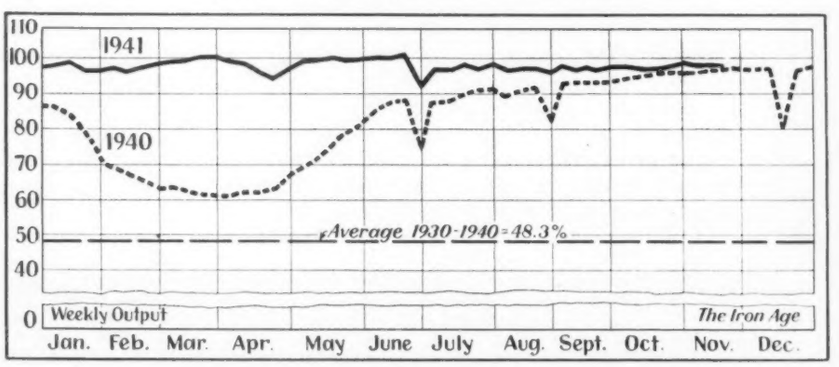
In the steel producing and consuming industries the gradual changeover to allocations from priorities is making itself felt. Upwards of 20,000 tons of steel plates have been taken from the books of one company and distributed among four or more steel makers with wide strip mills. The reallocated tonnage involves material for freight car construction, and the space left open by this redistribution will be utilized to expedite production of Naval and Maritime Commission material. The move for allocation on concrete bars, tool steel, alloy steel and other products gained in the past week. A scarcity of nails has materialized on some government-sponsored projects and it is expected allocations for this lowly item may soon be made.

Efforts to ease the plate shortage, which has extended over several months, are being intensified. Early this week Arthur G. McKee, builder of blast furnaces and steel mills, said at Cleveland that the present and expected plate bottleneck for 1942 could be entirely eliminated if a central scheduling board, manned by experienced steel men, were organized to refer each order to the mill best able to roll it. "If we properly schedule and allocate," Mr. McKee said, "we can make more munitions than the rest of the world put together." The Cleveland engineer said that the country would not have enough blast furnace capacity or scrap available either in 1942 or 1943 to make usable the proposed new steel plants which federal authorities are urging the steel industry to build. He said very few of the Government men handling the steel problem had "graphite in their hair" and added that "if steel people will think constructively, they will help the defense program immensely."

Scrap Entering Crucial Period

Easing of the iron and steel scrap shortage—one of the major industrial headaches of the year—still is far beyond the horizon and more steel plants have been forced to reduce production because of lack of scrap. Since industry is heading into a crucial period when scrap supplies will be more limited than ever, the government is pounding harder to force compliance with its regulations and is mapping further steps to limit the use of scrap.

Steel Ingot Production—Per Cent of Capacity
(Open Hearth, Bessemer and Electric Ingots)



Steel Ingot Production, by Districts—Per Cent of Capacity

	Pitts-burgh	Chi-cago	Val-leys	Phila-delphia	Cleve-land	Buf-falo	Wheel-ing	De-troit	South-ern	S.Ohio River	West-ern	St. Louis	East-ern	Aggre-gate
Current Week	96.0	99.5	89.0	92.0	95.0	90.0	92.0	112.5	95.5	100.0	96.0	105.5	109.0	95.5
Previous Week	98.0*	101.0	96.0	90.0	99.0	90.0	94.0	101.0	95.5	101.0	96.0	111.0	107.0	97.0*

* Revised

Various orders have been issued during the last two weeks directing scrap shipments to assist defense producers but the allocation plan is considered to be very much in its initial stages.

Schedule Revised on Scrap Prices

The new monthly scrap reports which are being filed with the Bureau of Mines by producers, dealers and consumers will enable the government to commandeer fixed percentages based on the reports filed for the preceding month. Dealers have been warned by OPM to comply more quickly with allocation orders. At Chicago one large steel producer plans to remove three or four open hearths on Dec. 1 due to lack of scrap while Cleveland expects a drop in operations and the Birmingham area cannot restore the rate of ingot production to recent high levels unless more scrap can be obtained. The OPA has amended the scrap price schedule to tap supplies of iron and steel scrap in every part of California and to reach tonnage in Oregon for California steel plants and foundries. Maximum basing point prices at San Francisco and Los Angeles have been increased $2.50 a ton on openhearth grades.

Operations Drop in Pittsburgh Area

Reflecting effects of the captive coal mine strike and of the scrap shortage, steel ingot production this week is estimated at 95.5 per cent of capacity, a decline of 1½ points from last week's rate of 97 per cent and two points below the rate prevailing before the strike began. Some steel producing districts, better fortified than others with respect to coal stocks, were not forced to reduce operations. While steel plants are endeavoring to put back all the openhearths as quickly as possible, it will not be possible to attain the pre-strike level immediately, due to the lag between getting a blast furnace back into blast and operating an openhearth furnace to which its hot metal is going.

Pittsburgh district steel operations are down two points this week to 96 per cent, Chicago off 1½ to 99.5, Youngstown down 7 to 89, Philadelphia up 2 to 92, Cleveland off 4 to 95, Buffalo unchanged at 90, Wheeling down 2 to 92, South unchanged at 95.5, Detroit up 11.5 to 112.5 and Southern Ohio River down 1 to 100, Western unchanged at 96, St. Louis off 4.5 to 105.5 and Eastern Seaboard up 2 to 109.

The largest defense order received so far in the Buffalo, N. Y., area is a $107 million contract for planes booked by Curtiss-Wright Corp. At Jamestown, N. Y., woodcarvers are again in demand as designers plan to substitute wood for steel and other metals needed in defense.

Priority Shutdowns Gain in Midwest

At Bellville, Ill., a shortage of materials threatens to shut down 22 plants employing more than one-third of the town's working population. In these and many other large and small industrial centers "priorities shutdowns" are increasing. Meanwhile an investigation by THE IRON AGE of industrial production at Evansville, Ind., a city designated by OPM (in September) as a "critical area" indicates that Evansville has gotten publicity but very little relief from the shortages of materials which are cutting production in its factories. Despite efforts of industrial companies in Evansville, the total of priority jobless in that city will be more than 5000 by Jan. 1.

Of interest to small plants is a proposal to establish a production requirement plan setting up quarterly blanket ratings covering civilian as well as defense manufacturers and extending to maintenance, repair and operating supplies. A new form PD-25-A will be utilized and more than 10,000 plants are expected to be operating under the plan's provisions shortly after Jan. 1.

Structural steel awards of 27,500 tons are double those of a week ago and include 18,000 tons for a plant at Las Vegas, Nev., for Basic Magnesium, Inc. Another sizable letting is 2730 tons for the Stickney division of the Chicago Sanitary District, Chicago. New structural steel projects declined to 12,500 tons from 16,700 tons last week, the new jobs including 4775 tons at Grand Blanc, Mich., for a tank plant for the Defense Plant Corp. and 2500 tons for the Maritime Commission. Reinforcing steel awards of 6550 tons include 5000 tons for an ammonia nitrate plant at Baxter Springs, Kans., and 1160 tons for a maintenance building at Patterson Field, Ohio.

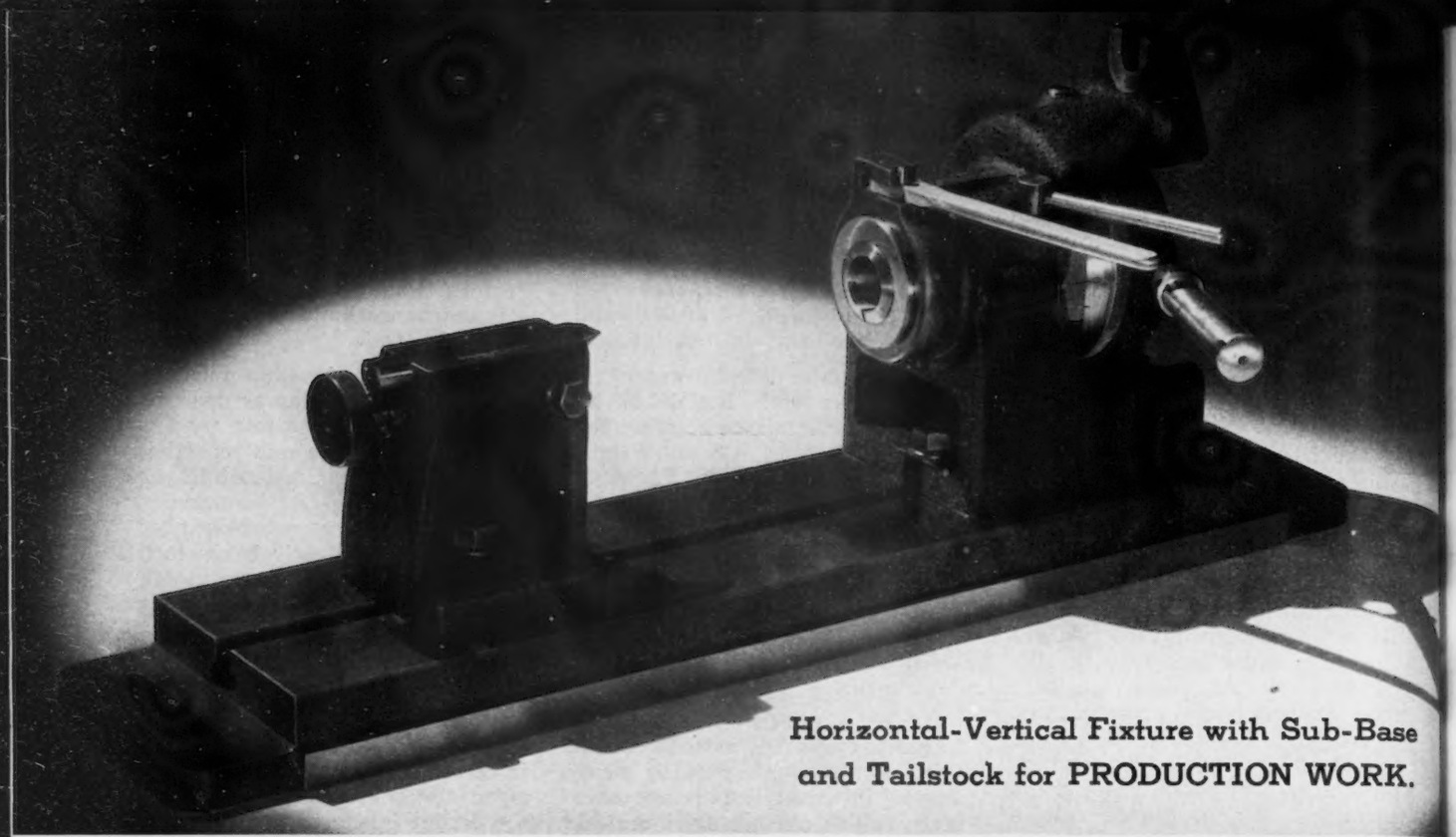
Steel bookings by Ohio mills for November are running as much as 30 per cent below the rate for October with only one mill reporting an increase, in this instance 10 per cent. Several large steel companies in Pennsylvania report November bookings from slightly below to 5 per cent above the October total, with so many priority ratings granted in the past month that most mills are in no position to handle anything except rated tonnage.

A major reason for the decline in steel orders is the drop in demand for sheets and structurals, the decline in sheet demand resulting from inability of non-defense consumers to obtain priority ratings and the realization by such consumers that even if they could get the necessary steel they would have difficulty in obtaining other materials. The government order restricting construction to defense plants and vital housing projects has resulted in a falling off in structural demand. One interesting inquiry developed during the past week has been for steel to be used for shell casings. A trial order of steel casings is expected to be placed shortly.

Ore Consumption Sets a Record

Consumption of Lake Superior ore by American blast furnaces reached a record level during October, with total tonnage at 6,612,186 gross tons, compared with the previous record of 6,534,424 tons in August and 6,447,537 tons for September. A principal reason for the sharp increase in ore consumption may be the enlarged capacities of many blast furnaces which have been relined during the past year. The tonnage of iron ore on hand at furnaces and on Lake Erie docks rose to 43,945,751 gross tons from 40,770,029 tons a month earlier.

An interesting event in the machine tool market this week was the chemical warfare department's placement of orders for 4-lb. incendiary bombs in Pittsburgh, Cleveland and Chicago.



Horizontal-Vertical Fixture with Sub-Base and Tailstock for PRODUCTION WORK.

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Ask for bulletin which describes many other features of these Hardinge Collet Index Fixtures.

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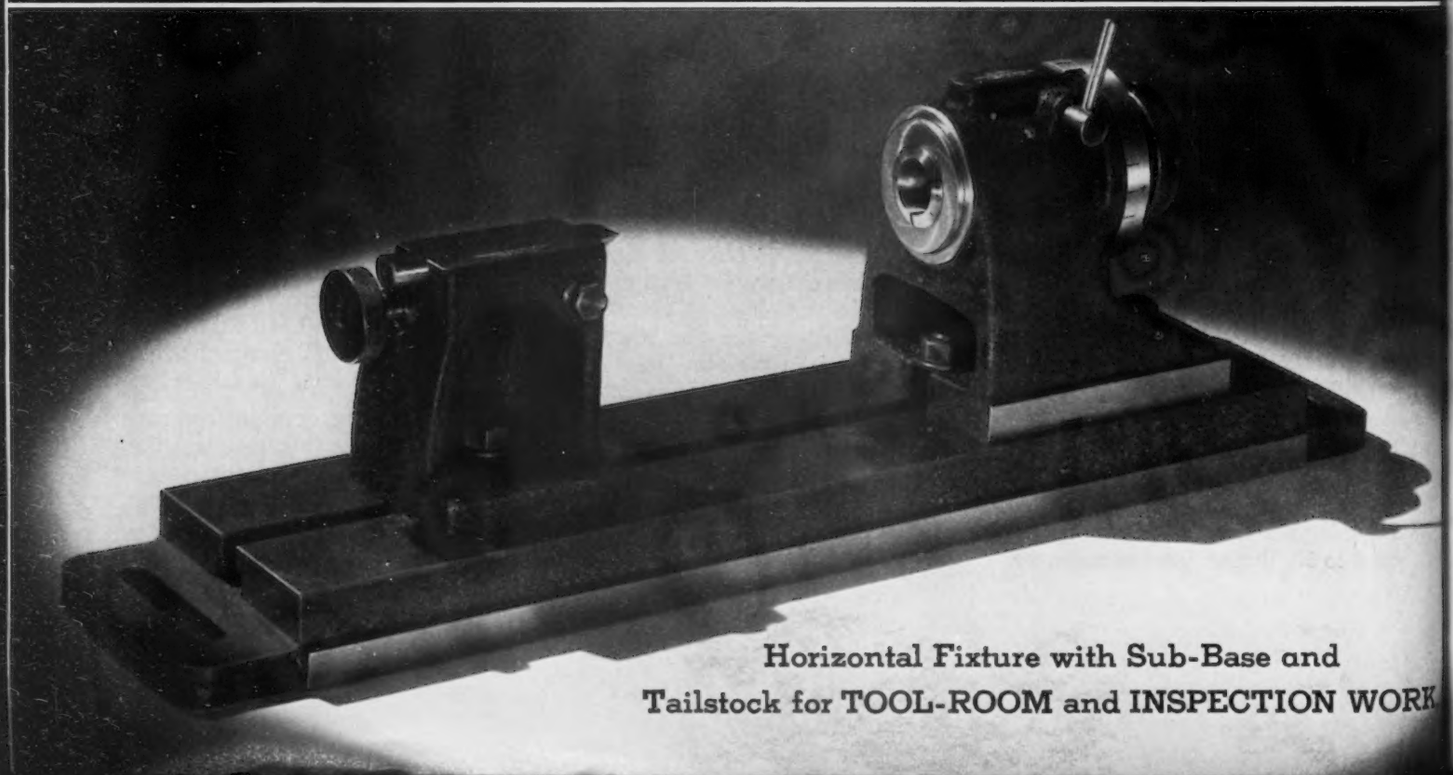


Horizontal Fixture with Sub-Base and Tailstock for TOOL-ROOM and INSPECTION WORK

News of Industry

Photo by International

STEELMEN: John L. Lewis and the CIO miners union struck the steel company owned coal mines and some commercial mines when the three men above, called to the White House for a conference on the strike, refused to grant the closed shop to Lewis. From left to right they are Frank Purnell, president, Youngstown Sheet & Tube Co., Eugene G. Grace, president, Bethlehem Steel Corp., and Benjamin F. Fairless, president, U. S. Steel Corp. **(See Page 81.)**

Evansville, Ind., Gets Publicity, No Aid on Priority Shutdown

Evansville, Ind.

• • • **More than two months ago,** Evansville, with five other much smaller midwest communities, was designated by the OPM as one of the most "critical areas" in the country, faced with crippling unemployment due to material shortages imposed by priorities. Purpose of the OPM designation was to bring defense contracts to the areas to stave off the economic crumbling which was imminent. Because of its size and industrial importance, Evansville has been regarded as the major "guinea pig" and has attracted national interest because so many other areas may soon be in the same fix.

This is the first published report of what has happened since the designation, and is the result of investigation by THE IRON AGE. Briefly, Evansville has gained considerable publicity but practically no economic succor. Actually, only one contract was discovered that grew directly out of this order. This amounted to less than $500,000 worth of boosters, and will furnish employment for about 100 workers.

In early September, when Evansville was called a "critical area," about 500 workers had been laid off due to material shortages. On Nov. 15, unemployment had grown to 3000. By Jan. 2, it will be between 4000 to 5000, out of a total of 21,900 industrial workers in the area.

Biggest single industry here is refrigerator manufacturing. Servel has laid off about 1000 out of normal 4300 employment. Sunbeam Electric Mfg. Co., which produces the Coldspot for Sears-Roebuck, has released about 1200 out of a 2800 payroll.

Next biggest sufferers are automotive firms. Chrysler's assembly plant has reduced its 900 payroll by 250. Briggs' body plant has cut off 450 out of 1400.

Further cuts are expected by each of these four companies. In addition, contemplated reductions before Jan. 1, have been reported to the local office of the Indiana Employment Security Division by these firms: Faultless Caster—about 150 out of 444; Never-Split Seat Co.—75 out of 125; George Koch Sons, Inc.—about 130 out of 200; Hansen Mfg. Co., Princeton, Ind.—40 out of 53. Approximately 1000 of the unemployed have already migrated to other areas where defense jobs are available.

More than half of Evansville's industrial workers are employed in the metal trades where material shortages have hit hardest. With current unemployment at 3000, more than one-tenth of the 96,000 population is suffering from thinner pocketbooks. Relief has not yet increased because the state's law provides 16 weeks of unemployment compensation. Retail sales, though started to fall off in November.

Strangely, the refrigerator and automotive lay-offs have been due more to production curtailment ordered by the government than to actual shortages of materials. One manufacturer revealed he had to ask some suppliers to stop shipping, that he could not use all materials on hand under the federal restrictions on production.

It becomes increasingly evident that saving of Evansville will have to be done by industry itself. Immediately following its designation, OPM sent engineering representatives of the Army, Navy, Army Air Corps, etc., to the city for investigation. The usual surveys of plant equipment followed. Out of this, with the exception of a comparatively small order for boosters awarded to Sunbeam, no contracts have been directly traceable to the designation. Neither

have any direct defense allocations such as ordnance plants been awarded the area. Evansville firms have been bidding more frequently on defense contracts, but little more than an invitation to bid results. Answering complaints of inaction, OPM has announced it will establish in the near future a branch of Division of Contract Distribution here.

As a start toward industry helping itself, Servel has added a wing on its plant where it will make cartridge cases and employ a total of 160 on three shifts. Chrysler has tried to help out by designating the area as its parts distribution center and is also bidding on a defense contract for the Evansville plant. Their officials have promised local authorities every assistance possible and are taking action to back up this promise. Other firms indicated they will follow a similar path.

No plant here can easily be converted to defense. Despite the fact that more than 50 per cent is metal working, it is all in those categories hardest hit by governmental restrictions. Other industries here range widely from meat packing to flour to clothing, and cut hardly any figure in defense. Chamber of Commerce estimates that not more than $15,000,000 in defense contracts are now held, and that this small figure fills about all the capacity available without change.

For this reason, local industrialists are not placing the entire blame on OPM's failure to get action following its implied promise of help by its designation. It is fully realized here that plants are ill-equipped for defense without radical changes. The quarrel is not so much with government's inability to bring in more defense contracts as it is with what they regard as unfair curtailment of their leading industries — unfair because they do not believe material supplies are low enough to warrant the curtailment. But they know further curtailment is coming and that many of the smaller local plants are not now getting the brass, steel, etc., needed to operate and that lay-offs will spread more. They have seen practically no concrete results from their being the "test tube" for two months in efforts to counteract artificially created unemployment. Industry here has about decided its only saviour is itself—by turning existing plants inside out and setting up facilities for the single purpose of defense production.

Plan Clearing House to Aid Non-Defense Plants

Chicago, Ill.

• • • A plan to start a Materials Clearing House is being considered by the Illinois Division of the National Small Businessmen's Association. The group says its surveys have uncovered surpluses of materials, tools and other remnants from changed models or from obsolete stocks. The clearing house will attempt to bring such material before prospective purchasers, and help out the 68 per cent of American plants which it is thought can never fit into the defense picture.

Cincinnati Association To Assist Small Shops

Cincinnati

• • • **The Cincinnati** Tool & Die Manufacturers' Association has been formed to work collectively in obtaining defense business for small shops, it was announced last week. Currently, the Association is functioning as a contact agency for the members and is working with the Division of Contract Dis-

GARY BATTLEGROUND: Shown here is a skirmish between striking and nonstriking coal miners at the Gary, W. Va., mine of U. S. Coal & Coke Co. Two men were shot here.

tribution of OPM. Officers of the new organization are: H. T. Colling, president; Matthew Rubendunst, vice-president; William R. Steltenpohl, secretary; S. D. Krueger, treasurer. These and Carl Kloos, Herbert C. Murrer, and K. R. Knowlton form the Board of Directors.

22 Plants May Close At Belleville, Ill.

St. Louis

• • • **A shortage of** materials caused by defense priorities will force 22 Belleville (Ill.) industries employing more than one-third of the city's working population to close within three weeks unless the government affords relief, according to a survey made by the Belleville Chamber of Commerce.

The Chamber reports that 322 molders and 73 clerks have withdrawn their membership cards from Bellevlle local unions to seek employment in other cities.

The city's principal industry, the manufacture of stoves, was decreasing before the defense program started, the total annual sales declining from $7,050,000 to $3,888,000 from 1928 to 1938, the survey shows.

"However, a further analysis of present conditions shows the industry facing total collapse due to restrictons on vital materials necessary for the continuous operation of the industry," the report continues. "The effects of this threatened shut down will cause a dislocation of all business of the community."

Steel Orders Extended

Washington

• • • **Acting OPM Director** of Priorities J. S. Knowlson on Tuesday announced that general preference orders affecting pig iron, steel, steel warehouses and special kinds of iron and steel had been extended to Dec. 31, 1942. All of them had been scheduled to expire Nov. 30, 1941. Most important of these orders is M-21 which puts steel under priority control. Orders M-17, M-21-a and M-21-b also are extended. Another order extended is preference rating order No. P-31.

Lewis-Murray Break Highlights CIO Meet

Detroit

• • • **The atmosphere** of the annual convention of the CIO here last week was one of almost complete repudiation of John L. Lewis together with a backing of President Roosevelt's policies on labor and defense. Unanimous reelection of Philip Murray as president of the CIO without expected opposition from Lewis marked the parting of the ways between the two, emphasized by Lewis' failure to send any message of congratulation to Murray or to send any message to the convention as its sessions ended.

Expected conflicts between Lewis and Murray failed to develop during the week, although Lewis, absent because of the coal strike, had his daughter, Kathryn, and his brother, Denny, here to represent him. From the opening of the convention it was apparent that Murray was firmly entrenched as spokesman for 5,000,000 CIO members. Delegates voted reluctantly to support the coal mine strike but only as a matter of academic support, and not as official backing for Lewis.

Around the convention hall labor wondered whether Lewis would strike out to form still a third labor federation as he formed the CIO after breaking away from the American Federation of Labor.

Murray, no longer beholden to Lewis for his presidency, appeared likely to take the initiative in setting CIO policy hereafter. His plan for industrial councils to implement the national defense program was reiterated time and again during the convention by him and various committees in their resolutions.

Murray warned against any attempt to restrict labor by legislation or otherwise. He warned Ford workers, however, against slow-downs and work stoppages.

After a day of conferences Sunday, Murray prepared to leave Detroit without answering whether he would again participate in the National Labor Mediation Board,

LABOR ON THE MARCH: Scenes like this are not infrequent in U. S. industry, and the defense program is suffering. Here three CIO Mine Union pickets are trying to keep a fellow miner from going to work in the H. C. Frick Coke Co. Red Lion mine at Uniontown, Pa.

Photo by Associated Press

now that the coal mine strike has been settled.

Goals for the CIO in 1942 include organization of the oil industry, continuation of attempts to line up the non-ferrous metals industry, and a drive to expand CIO influence in the South. Edwin Smith, formerly of NLRB, will be director of the campaign to organize the oil industry.

Fore River Workers Vote Against CIO Union

• • • **The day before** Thanksgiving in Massachusetts, 12,608 workers of the Fore River Works, shipbuilding division of Bethlehem Steel Co. cast votes. Of the 12,608 votes, 12,555, or 87 per cent of the workers eligible to vote, were effective. There were 8991 "no" votes; 3555 "yes." The vote was on a single ballot item: "Do you desire to be represented for the purpose of collective bargaining by the Industrial Union of Marine and Shipbuilders Union of America, Local No. 5?" It was about a 2½ to 1 slap in the face for the CIO and the National Labor Relations Board. The latter had deferred from holding an election at the yards three times in the hope the CIO would gather strength.

Inquiry Demanded on CIO Membership Claims

Cleveland

• • • **Labor unsettlement** here recently was climaxed by a demand by the independent Automotive and Aircraft Workers' Alliance at Thompson Products Co. that regional NLRB offices conduct an investigation of CIO plant membership claims, charging that the CIO Labor Board petition for bargaining rights at the plant was "a Communistic scheme" to interfere with the firm's defense output. This charge was contained in a letter to the NLRB regional director, Hugh E. Sperry, and went on to contend that the CIO-UAW had only 300 members among the aircraft plant's 6700 employees and that many of the CIO's "membership cards do not carry bona fide signatures." Mr. Sperry stated that since the Labor Board had ordered the disestablishment of the AAWA as "company-dominated," his office regarded the union as "non-existent."

"Wildcat" strikes continued to snipe at defense production with a day's production lost at the Breckenridge Machine Co. and the Canton Naval Gun Plant, while a strike was threatened at the Hertner Electric Co. At the May-Fran Engineering Co., half of the company's small staff picketed the plant for the alleged "lockout" of men recently laid off. A sympathy strike was reported at the Lindsay Wire Weaving Co., where 400 men walked out after 40 had previously struck for a 10 per cent increase.

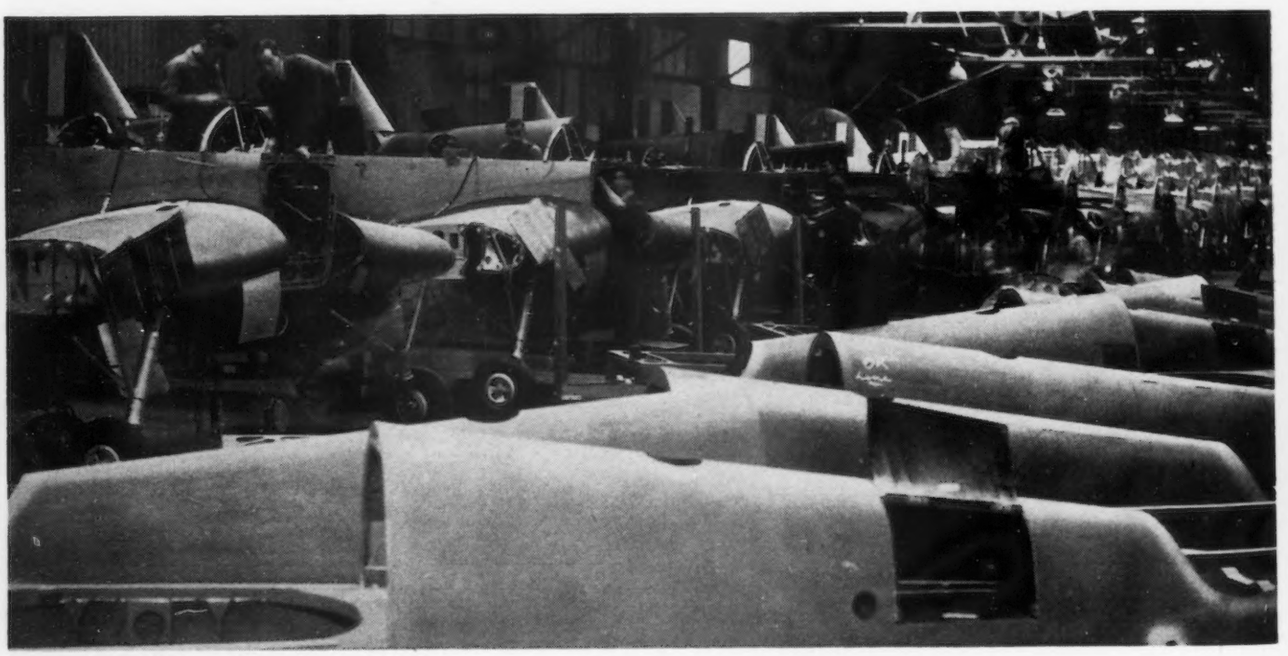
Chrysler Labor Contract Extended to Tank Plant

Detroit

• • • **An agreement** has been signed by Chrysler Corp. extending terms of its contract with the UAW-CIO to cover workers in the Chrysler tank arsenal. The agreement also adjusts wages for about one-third of the employees because of the union's contention that some work at the arsenal is more difficult than work in the auto plants and requires more skill. Previously the union had rejected a contract which provided wages comparable with auto plant wages, but also specified higher wages to 12 specific groups whose operations have no parallel in auto plants. These 12 special wage groups included about 400 men. Since the contract covers about 7200 workers, the new high wages go to about 2400 men.

250 MPH. TRAINING PLANES: RAF pilots are now being taught to fly high speed planes such as this Miles Master II, said to be the fastest trainer in the world. It is equipped with a Mercury air-cooled engine and a Rotol constant speed airscrew.

Photo by British-Combine



British Export Policy Defined by Memorandum

• • • **Charges made that the British** have been using Lend-Lease materials to compete with United States exporters in foreign markets are without foundation, according to the second report of the Office of Lend-Lease Administration, Washington. Most of the charges were made during the three or four months following the passage of the act on March 11, 1941, and the report points out that it is almost impossible that lend-lease materials could have been fabricated and re-exported when these charges were made.

The Defense Aid Supplemental Appropriation Act, which really set lend-lease in motion, was enacted on Mar. 27. Requests for raw materials and articles available for re-export were not filed for some considerable time thereafter and shipment of such articles such as semi-finished steel, tinplate, etc., did not begin until mid-July or later. The competition complained of was clearly competition from Britain's own products, and occurred at a time when Britain was rapidly depleting her own capital resources in America in order to pay for her war supplies.

Even this competition is rapidly decreasing, since British exports have declined precipitately since 1937. For example, United Kingdom exports of iron and steel manufactures to points outside the Empire dropped 70 per cent from 1937 to 1940. Exports of machinery dropped 60 per cent in the same period. The first six months of 1941 showed even a more drastic decline. For this period, exports of iron and steel products dropped a further 51 per cent and exports of machinery, a further 46 per cent, making the exports of these major categories of articles only 14.7 and 21.6 per cent respectively of their 1937 level.

Apparently to silence criticism, however, a memorandum on United Kingdom export policy was handed Ambassador John G. Winant by the Hon. Anthony Eden on Sept. 10. This memorandum contains two basic assurances by the British. The first is that the lend-lease materials which might be available for re-export have been and will be used within the Empire, and then only for needs essential for the war effort. The second assurance is that the British will not permit exports of materials similar to those lend-leased to them, in any manner which will enable their exporters to enter new markets or to extend their trade at the expense of the United States exporters. The entire British export trade is restricted to the irreducible minimum necessary to supply or obtain materials essential to the war effort, the memorandum states.

There are certain exceptions noted, however, as to exporting of materials of a type which is being restricted in the United States on the grounds of short supply or which the British obtain on lend-lease. These special cases are: (a). Material needed overseas in connection with the war effort which cannot be obtained from the United States; (b) small quantities of such materials needed as minor though essential components of exports which otherwise are composed of materials not in short supply here, and (c) repair parts for British machinery and plant now in use and machinery and plant needed to complete installations under construction and already contracted for.

It is apparent from the above that the British government, since lend-lease began, is leaning over backwards not to promote exports at our expense. In fact, from other sources THE IRON AGE has learned that the British have even prohibited exports to the United States itself of certain items, much to the dismay of the importers here.

What some individual British firms may be doing is another matter, or at least was up until the Sept. 10 memorandum was devised. As late as September, British export publications, dated in August, were being received in this country advertising such items as machine tools of all sorts, high speed steel cutters, and aluminum and brass castings for immediate delivery. The advertisements were in both English and Spanish and were obviously directed at South American markets. It is now understood, however, that the British government is asking its manufacturers to cease and desist from that type of advertising. At the same time we must recognize that up to the time of lend-lease, the United Kingdom was desperate for foreign exchange and was moving heaven and earth to increase her exports. She is not under that same type of compunction now.

LAMSON & SESSIONS EMPLOYEES HONORED: A half century of service by two employees of Lamson & Sessions Co., Cleveland, was celebrated recently at a dinner. Pictured here are William Behrend, George S. Case, Sr., Lamson chairman, Richard Vacha and Whiting Williams, radio commentator. Vacha and Behrend received gold medals.

Industrial Milestones

• • • **The** Ashcroft Gauge Division of Manning, Maxwell & Moore, Inc., Bridgeport, Conn., is celebrating its 90th birthday this year.

The Bourdon Tube principle of making pressure gages was invented by a French professor. Mr. Ashcroft, the founder of the present Ashcroft Co., saw the gage on exhibition in London in 1851, and obtained exclusive rights to manufacture it in the United States. The 90th anniversary will be a stainless steel anniversary. The company will make almost twice as many gages this year as in any previous 12 months' period.

Crucible, Heppenstall and Carnegie-Illinois Awarded Navy "E"

• • • **Carnegie-Illinois Steel** Corp., Pittsburgh, and Heppenstall Co., Lawrenceville, Pa., maker of ordnance materials, were last week awarded the Navy's "E" pennant, and the Bureau of Ordnance flag. Admiral William H. Standley, formerly chief of naval operations, who presented the Carnegie-Illinois award before 8500 employees of the company, described Russian preparations for moving factories in case of need. Heppenstall employees were told it is the opinion of many that Russia "is not only fighting the battle of the democracies now but that they will be found on the side of the democracies when the time comes to rebuild the world after the war." Admiral Standley has recently returned from Russia where he represented the U. S. Navy in a war supply mission.

Harrison, N. J.

• • • **Recognition of the** contributions of Crucible Steel Co. of America to the defense program was made here Tuesday when Rear Admiral W. H. P. Blandy of the U. S. Navy presented a Navy "E" pennant to A. E. Van Cleve, manager of Crucible's local Atha works. Awarding of the pennant, which permits Crucible to fly the flag of the Bureau of Ordnance and the company's employees to wear a Navy "E" button, was, according to Frank Knox, Secretary of the Navy, "in recognition of outstanding effort in the production of ordnance materials vital to national defense."

The presentation took place before a large gathering of company employees, officials and guests. F. B. Hufnagel, chairman of the board of Crucible, spoke at the ceremonies.

The Atha plant, founded in 1862, produces a wide variety of ordnance equipment, including armor piercing projectiles, large and small guns, anti-aircraft shells, periscope heads, propeller shafts and gun liners and jackets. Its peace-time products include tool steels, stainless steels, welding rods, Alnico magnets, valve steels and other specialty steels.

WELL DONE: A. E. Van Cleve, manager of Atha Works of Crucible Steel Co. of America, Harrison, N. J., whose plant was awarded a Navy E on Nov. 25 as recognition of the company's outstanding effort in the production of ordnance materials. The Navy E award is the Navy's way of saying "Well Done."

Superior Ore Usage Hits Record in October

Cleveland

• • • **Consumption of** Lake Superior iron ore by American blast furnaces reached a new record level during October, with total tonnage at 6,612,186 gross tons, according to the Lake Superior Iron Ore Association. This exceeds the recent record of 6,534,424 gross tons for last August and represents an even higher gain above the 6,447,537 tons for September.

A major reason for the sharp increase in consumption of Lake Superior iron ore during the latest month, as against the 6,051,347 gross tons used in October, 1940, may be attributed to the enlarged capacities of many blast furnaces which have been relined during the past year. This is borne out by the fact that there were 187 furnaces operating in the United States and Canada on Nov. 1, as against 189 operating a year ago.

The tonnage of iron ore on hand at furnaces and on Lake Erie docks rose to 43,945,751 gross tons from 40,770,029 tons a month ago. Of the stocks on hand 37,474,314 gross tons were at U. S. furnaces, 5,093,528 gross tons were at Lake Erie docks on the U. S. side, and 1,377,909 gross tons were at Canadian furnaces.

War Production a Year Ahead Of What It Was in 1917

St. Louis

• • • **"War production now** is at least a year ahead of what it was during the World War," Frank W. Curtis, chief engineer, Van Norman Machine Tool Co., and president of the American Society of Tool Engineers, stated in an interview here recently while attending an executive committee meeting of the society in connection with the society's annual meeting to be held in St. Louis, Mar. 12 to 14. "The machine tool industry has expanded from $150,000,000 to $850,000,000, and next year will reach $1,000,000,000.

"Every day the industry is producing 1000 machines. The only bottleneck, despite what some others may say, is in manufacture of small cutting tools. Manufacturers are conserving on them now, and within four months the supply will be adequate.

"Authorities soon will learn there is plenty of steel, bronze, brass, copper, and all the other metals to supply any future defense demands and will see that priorities are granted more freely. The supply of metal is adequate; it merely is a matter of shifting it between plants equitably. Eight hundred new plants have come into existence this year. The supply will be adequate even if that number doubles next year."

Terminal Association Buys 5 Diesels

St. Louis

• • • **Terminal Railroad** Association of St. Louis has bought five 1000-hp. diesel electric switching locomotives. Two each will be made by the American Locomotive Co. and Electro-Motive Corp., and one by Baldwin Locomotive Works, for delivery next summer.

Correction

• • • **The air raid shelter** shown on page 92 of the Nov. 13 issue of THE IRON AGE was developed by American Rolling Mill Co., Middletown, Ohio, instead of by the firm credited.

Detroit Protests Against Tax Aid for British

Detroit

• • • **Municipal officials** are protesting through Congressional channels against a proposed treaty which would extend the privilege of local tax exemption to Britain in connection with British government defense properties here. At stake is tax revenue from machinery in the Packard Motor Car Co. and other factories. Total value on this now is estimated at $21,000,000 at Packard alone, and the equipment at Packard is expected to be increased in the next year. The city also is protesting proposed exemptions on properties here financed by the RFC, Defense Plant Corp., and other federal agencies.

Buyers Sought for Steel Intended for Export

• • • **Despite the clamor** for steel, New York interests have had difficulty disposing of odd lots intended for export but which failed to clear this country for one reason or another due to wartime conditions.

OPM recently issued several lists describing the "surplus and distressed" material. Attempts to move the lots had been made by banks, exporters or steel companies.

Much of the steel remaining for sale is made to foreign specifications, in special sizes and analyses unsuited to quick usage in American plants. Some lots fell into the distressed catagory when France went under or when other nations came under the heel of Hitler. Still other lots were found in vessels which the United States took over.

C. N. Nyden, administrator of the scheduling unit of the aircraft division of OPM, with offices in the Mutual Home Bldg., Dayton, Ohio, sent out one of the lists recently. Special alloy steels originally intended for Hispano-Suiza engines were described in a list issued by the French Embassy, 20 Exchange Place, New York, in early October. Roger Chaudon, 50 Pine Street, New York, has other steel in the same catagory available for sale.

In New York export circles last week it was said the "distressed" steels had been "pretty well picked over."

A pronounced upturn in exports of steel to South America has been noticed recently, the exporters said. Prices are high, with tin plate commanding as high as $30 per double base box recently, about three times above the domestic level. Small lots of some old tin plate intended for shipment to Spain, but prevented from leaving the country because its ultimate destination was questioned, have been selling at nearly double domestic prices.

Meanwhile occasional imports from other countries are noted. A shipment of piano wire from Great Britain came to the United States recently, it was said.

Ford Fleet Under Closed Shop Contract

Detroit

• • • **Ford Motor Co.** has signed a closed shop union contract with the National Maritime Union-CIO for its entire Great Lakes fleet. The contract includes the standard NMU-CIO provisions for hiring halls. About 300 employees are covered by the contract. Negotiations now are to be carried out to cover the Ford ocean-going fleet.

Reliance Electric Buys Plant From Cleveland Hobbing Co.

Cleveland

• • • **Reliance Electric** & Engineering Co., Cleveland, has announced the purchase of the present plant of Cleveland Hobbing Machine Co., giving them 31,000 additional sq. ft. of floor space. Cleveland Hobbing Machine Co. will move before Dec. 31 to its new plant in Euclid, Ohio.

Theodore Trecker Honored At K. & T.'s Annual Dinner

Milwaukee

• • • **When members of** the Kearney & Trecker Corp. Old Timers' club held their annual dinner recently to honor three employees who have been with the firm more than 40 years each, a highlight of the program was the presentation of an additional watch to Theodore Trecker, the boss, by his son, Edgar Trecker, works manager. The "old man," founder and president of the company, has a record of 43 years with the firm. The Milwaukee machinery company has 82 veterans with at least 20 years of service.

CYLINDER HEADS for 1700 hp. Cyclone 14-cylinder aircraft engines are being machined on this battery of drill presses in the new Cincinnati plant of the Wright Aeronautical Corp. Similar rows of machine tools, set up for "in-line" production, now cover the entire 33-acre floor space of the plant's machine shop.

Consair Plant Nears Completion At Ft. Worth, Tex.

By T. E. LLOYD

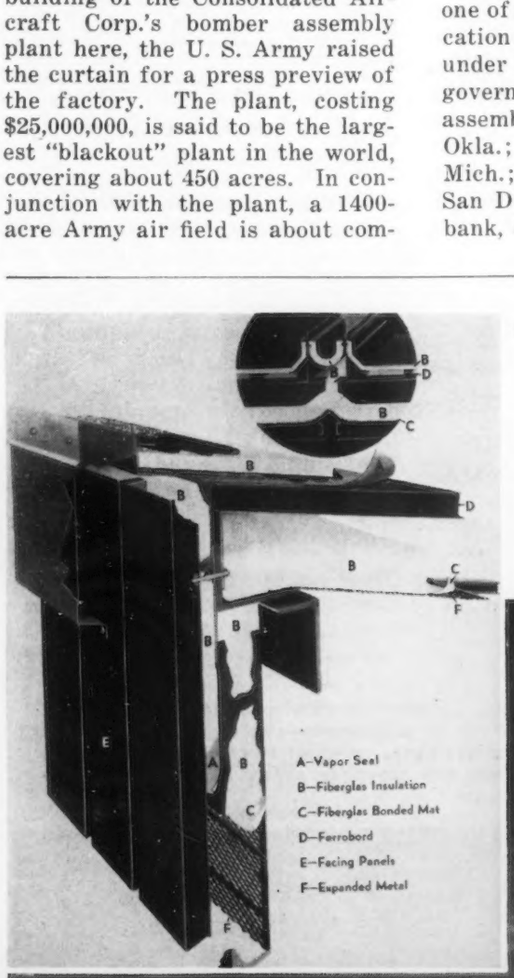
Fort Worth, Texas

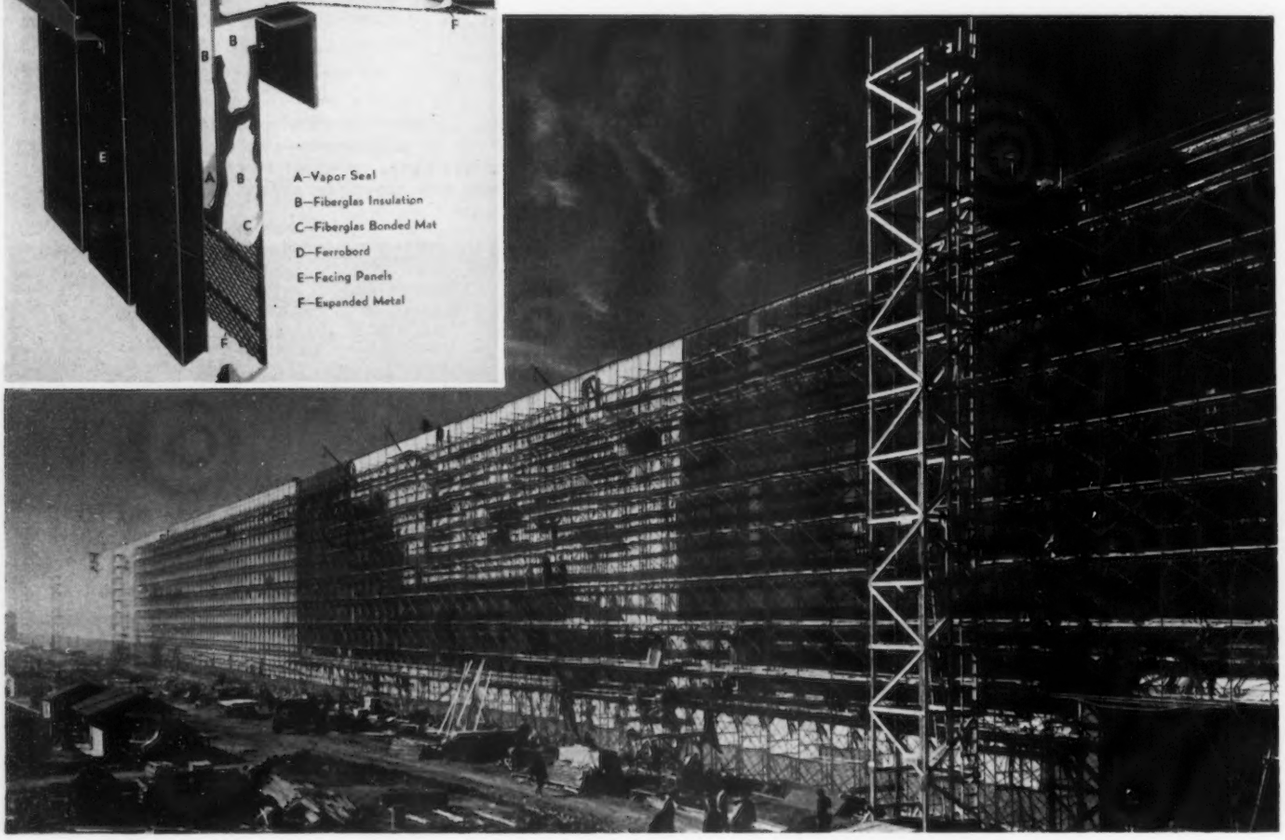
• • • **A few hours before the last** fabricated structural steel was swung into place in the main building of the Consolidated Aircraft Corp.'s bomber assembly plant here, the U. S. Army raised the curtain for a press preview of the factory. The plant, costing $25,000,000, is said to be the largest "blackout" plant in the world, covering about 450 acres. In conjunction with the plant, a 1400-acre Army air field is about completed, the two runways on which will be about 7200 ft. long.

The main building in the plant, which will be used to assemble monthly from 50 to 60 B-24's, the Consolidataed 29-ton, 4-engine heavy bomber known as the "Liberator" in Britain, is 4000 ft. long and 320 ft. wide without a supporting column to obstruct the assembly line. The plant, to be in operation by mid-July, 1942, is one of seven to complete the fabrication of the 4-engine bombers under the 500 bomber-a-month government program. The other assembly plants will be at Tulsa, Okla.; Willow Run (Ypsalanti), Mich.; Wichita, Kan.; Seattle; San Diego, Long Beach, and Burbank, Calif.

The Fort Worth plant will be completed by Feb. 1, and an identical plant at Tulsa, Okla., will be completed about two months later. The Tulsa plant will be operated by the Douglas Aircraft Corp. These plants will employ, when in full operation, about 16,000 men in two 10-hr. shifts, and employees for the Ft. Worth plant are now being trained at the Consolidated plant at San Diego.

The construction of this factory, by the Austin Co., under the direction of Army engineers, has many unusual features. Glass wool is used in the walls and roof as insulation by a new process developed by the Austin Co., in conjunction with Truscon Steel Co. Metal lath, over which is placed





SUCCESSIVE STAGES of erection of the Fort Worth bomber assembly plant may be observed here. The side wall and roof construction used here represents a new approach to insulating factory areas for economical air-conditioning and acoustical control. The system was developed by Austin Co., engineers around products developed by the Truscon Steel Co., and Fiberglas insulating materials produced by Owens-Corning Fiberglas Corp. At the left is a diagrammatic drawing of the roof and sidewall construction of the factory building, showing the glass wool insulation. A—Scutan vapor seal paper, B—Fiberglas insulation, C—Fiberglas 7 mm. mat, D—Fiberglas board, E—facing panels, and F—expanded metal lath.

3 in. of white Fiberglas, of 1½ lb. density, on a 7 mm. Fiberglas mat, is suspended on channels anchored to the roof purlins. On top of the purlins is laid a steel roof deck, covered with a Scutan vapor seal paper, a Fiberglas board, another layer of paper, and a 20-year bonded tar and gravel roof.

The sidewalls of the buildings are of brick to a height of about 12 ft. and of Fiberglas construction to the eaves of the roof. The inner walls are made up of sheet metal channels into which is placed 4 in. of Fiberglas wool cemented to a sheet of asphalt paper, a sheet of the 7 mm. white Fiberglas mat, and a strip of metal lath. These channels are then placed with the metal lath to the inside of the building and bolted to plates connected to the structural steel in the building. Over the outside of the sheet metal channel is a coating of cold asphalt paint, a layer of vapor-seal paper, a layer of Fiberglas board, and formed steel, panels fastened to the sidewall of the building with bolts to the plates that are on the structural.

By the use of this Fiberglas or glass wool sonstruction, it is estimated that the glass lined walls and ceiling of the assembly plant will have the same heat and cold insulating properties of an ordinary brick wall 30 to 40 in. thick, and will deaden 60 to 70 per cent of the factory noises.

The structural steel in the factory, totalling 27,000 tons, was fabricated in five plants of Bethlehem Steel Co., at Leetsdale, Pa.; Buffalo; Rankin, Pa.; Chicago, and Pottstown, Pa.; and by the Ingals Iron Co., at Verona, Pa. Equipment and machinery that will be used in the plant has been purchased by the Army engineers and is at present stored in various warehouses throughout the Southwest.

While definite plans have not yet been made, it is understood that a duplication of the present plant can be constructed adjacent to the present main building, and that sufficient property has been obtained to construct buildings in which the sub-assemblies, that will for the present be made by Ford, at Ypsalanti, Mich., can be manufactured. Also, Lake Worth, adjacent to the plant, will be used as a mid-continent base for flying boats.

Army engineers representing the War Department negotiated the construction contract directly with the Austin Co., Cleveland. The total value of the assembly factory, when all equipment is installed, is believed to be close to $40,000,000.

The B-24, Consolidated's heavy bomber can carry four tons of bombs at a speed in excess of 300 m.p.h., and the ship has a cruising range of about 3000 miles. The ship weighs about 29 tons, two tons more than the Army's B-17 "Flying Fortress" bombers. A larger edition of the B-24, with greater speed, bombing capacity and range, known as the B-32, will probably be built here later. It is also believed that with certain mechanical changes in the assembly line technique, the PBY Consolidated flying boats that achieved much fame in British service, known there as "Catalinas," may be built here. Facilities are available for handling landings and take-offs of these huge flying boats.

Steel Exports Rise 4% in September

• • • **Exports** of iron and steel products increased in September, totaling 641,094 gross tons valued at $38,946,334, according to the Department of Commerce. Representing a gain of 4 per cent over August exports of 617,477 tons valued at $44,375,965, the figure is still well below September, 1940, exports of 965,444 tons valued at $50,630,630.

Cumulative 9 months' exports for 1941 at 4,753,255 tons valued at $341,379,998 are likewise below the 5,487,012 tons valued at $341,-841,419 exported during the comparable period of 1940.

Non-alloy ingots, blooms, etc., was, in point of tonnage, the most important item exported in September, the total of 328,662 tons representing an increase of 51 per cent over August exports.

At 65,486 tons valued at $1,214,-548, exports of scrap in September decreased from the 80,255 tons valued at $1,564,209 recorded in August. Iron and steel scrap accounted for 64,548 tons of the total.

CONCRETE HOUSES: Spraying of a concrete mixture on large pneumatic rubber forms is a Defense Homes Corp. experiment being carried on near Washington, D. C. The forms are easily removed after the concrete hardens.

Clifford Stilwell Dies in Cleveland

Cleveland

• • • **Clifford S. Stilwell,** executive vice-president of Warner & Swasey Co., one of the world's largest machine tool manufacturers, died here, Nov. 19, ten days after suffering a heart attack. He was 51 years old. Mr. Stilwell recently had been elected president of the National Machine Tool Builders' Association. He also was president of the University Club, chairman of the board of trustees of Denison University, and a member of the Cleveland Engineering Society, and the Cleveland Chamber of Commerce.

Mr. Stilwell was born in Freehold, N. J. Upon graduation from Denison University in 1912, he joined Warner & Swasey Co. and spent some time in shop sales work in Chicago, subsequently holding the position of Detroit branch manager for 17 years. In 1930 he returned to Cleveland as sales manager and became vice-president of the company in 1935.

His death robbed the machine tool industry of one of its most capable executives and broke up a brother team that has rarely been equalled in this country. Since boyhood, Mr. Stilwell and his brother, Charles J. Stilwell, president of Warner & Swasey, had been associated together in their school and business careers. On their very first jobs, the brothers worked for John D. Rockefeller on his Forest Hills golf course, at the rate of 25 cents per hour, and started the teamwork that was to bring both of them to the pinnacle of business success.

The brothers attended Denison University at the same time, with Charles being graduated in 1910 while Clifford was graduated in 1912.

Charles Stilwell stepped into a job at Warner & Swasey, and Clifford found an opening at the same company upon graduation. Working in the machine shop, Clifford Stilwell learned rapidly about machine tools. In later years it was said there was no machine at the Warner & Swasey shop that he could not operate himself.

The growing demands upon the company for an increasing volume of machines to go into defense

Clifford S. Stilwell

work imposed terrific strains upon both brothers during the past two years. Friends felt that the strain was the real cause of Clifford Stilwell's death. The company has expanded three times within the past year, involving the training of apprentices, obtaining raw materials, and yet without hampering the production floor. The brothers helped organize their firm's apprentice training system, which has become a model in many plants throughout the country.

Funeral services held on Nov. 21 were attended by many outstanding machine tool executives and other prominent citizens and friends. Among the machine tool men present were George H. Johnson, president of Gisholt Machine Co., Madison, Wis., who succeeds Mr. Stilwell as president of the National Machine Tool Builders' Association; John S. Chafee, vice-president, Browne and Sharpe Mfg. Co., Providence, and first vice-president of the Association; Ralph E. Flanders, president of Jones & Lamson Machine Co., Springfield, Vt.; Edwin C. Bullard, vice-president, Bullard Co., Bridgeport, Conn.; W. Scott Alder, president, American Tool Works; J. C. Cotner, vice-president, Logansport Machine Tool Co.; H. M. Lucas, president, Lucas Machine Tool Co.; T. H. Doan, president, Foote-Burt Co.; Tell Berna, secretary, National Machine Tool Builders' Association; and others.

The Warner & Swasey Co. closed all day Friday, Nov. 21, in tribute to Mr. Stilwell.

Scheduling is Key To Plate Jam—McKee

Cleveland

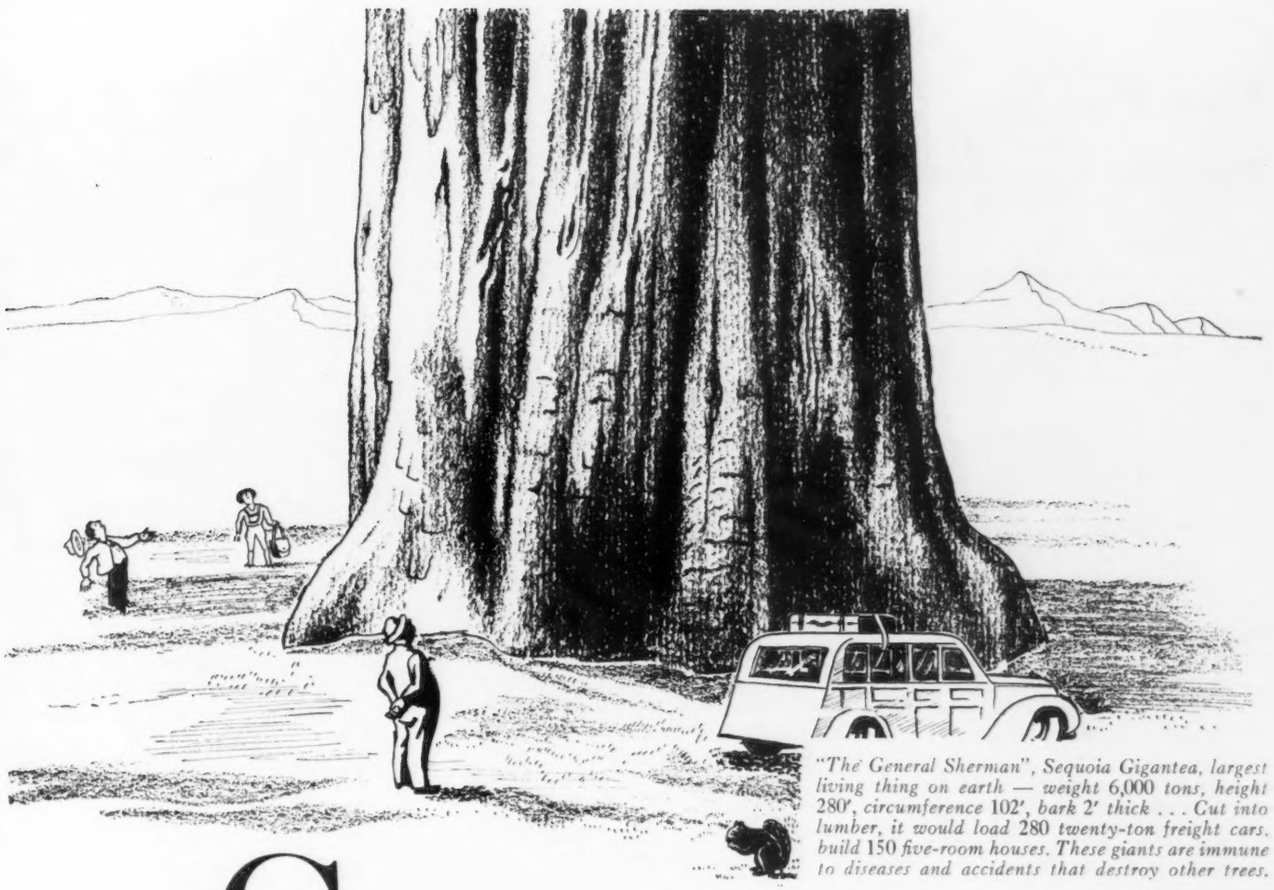
• • • **The present** and expected plate bottleneck for 1942 could be entirely eliminated, in the opinion of Arthur G. McKee, president, Arthur G. McKee Co., engineers and builders of blast furnaces and steel mills, who spoke before the Cleveland District Section of Association of Iron & Steel Engineers, Nov. 24, "If there were a central scheduling board, manned by experienced steel men to refer each order to the logical mill."

Mr. McKee brought out in his talk that A. D. Whiteside, resigning head of the OPM Iron and Steel Branch, had requested him to analyze potential plate producing capacity for next year, especially in view of the fact Mr. Whiteside estimated we would require 8½ million tons of plate in 1942. Analysis showed, he said, that present mills can roll 4,622,650 gross tons of sheared plates, while strip mills can roll 3,210,000 gross tons, with narrow mills rolling an approximate 7,869,500 tons and universal mills turning out 2,235,300 gross tons. He pointed out that by the addition of some new equipment our present steel mills might roll as much as 5,900,000 tons.

However, not taking into consideration the addition of such equipment, and eliminating the output of narrow mills which would also be subject to some low-cost equipment installations, it was indicated that our present plate rolling capacity would be in the vicinity of 10,057,000 gross tons. At this point, Mr. McKee indicated that for the sake of conservatism and to allow for a certain amount of scrap and inefficiency at various points, at strip mills he was willing to deduct as much as 35 per cent from this total potential tonnage from strip mills so that in his opinion our practical productivity of plates would be as follows (net tons):

Sheared plate 5,177,000
Universal plate 2,500,000
Strip plate 2,327,000
Total practical plate capacity 10,004,000 net tons.

Yet, this would still make available sufficient strip and sheet to meet all defense needs, he said.



"The General Sherman", Sequoia Gigantea, largest living thing on earth — weight 6,000 tons, height 280', circumference 102', bark 2' thick . . . Cut into lumber, it would load 280 twenty-ton freight cars. build 150 five-room houses. These giants are immune to diseases and accidents that destroy other trees.

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New Plan Seen Simplifying Priority System; Licensing Likely in Price Bill

Washington

• • • **As a step** toward a solution of production problems arising under the present preference rating system, OPM's Priorities Division is expected to announce a new procedure called a Production Requirement Plan, with which will be issued application form PD-25-a. It is estimated that 10,000 business firms will operate under this new plan shortly after the turn of the year. The shift is expected to be gradual with existing preference and priority ratings being used until their expiration.

Beginning with 1942 the plan will set quarterly blanket ratings covering essential civilian as well as defense manufacturers, which extend to maintenance, repair and operating supplies. No preference ratings other than authorized on form PD-25-a may be used by producers operating under the plan, unless specific authorization is granted by the Division of Priorities through the Production Requirements Plan Section.

The plan is partially aimed to relieve hardship cases where a lack of materials prevents continued operations. Another factor which will affect rating changes is the situation where a producer may have a preference rating of A-10 (as, for example, under the Defense Supplies Rating Plan), but his orders have higher priority ratings. The object will be to scale his preference rating to more nearly correspond with the preponderance of his rated orders, so as to grant mean ratings. The new application differs from the old one in that it requires more detailed information, but it is claimed that it will involve less paper work than any previous plan. A producer may indorse his purchase orders using a regular form which is provided, and suppliers may obtain the rating by filing acceptance with the Priorities Division.

The first page of the new application (PD-25-a) calls for information similar to that required by present form PD-25-e, relating to inventory, previous inventory, and withdrawal figures. The second page requires exact detail respecting the quantity of material needs for the end product which are enumerated in the new Material List No. 1.

Material List No. 1 is a comprehensive tabulation of critical materials. The third page is the same as page two, except that it is for all other material requirements.

After these requirements are analyzed, the producer will be given a 90-day clearance with a rating for the materials necessary. OPM will revise quantities in its discretion.

The blanket rating, in so far as it is designed to encompass civilian manufactures, will be granted only for essential civilian items. Hence, before the blanket rating is applied to civilian manufactures, the necessity of the end product from a defense standpoint will be inquired into.

Form PD-25-d has definitely been abandoned, and it is probable that PD-25-c also will be eliminated. Both forms relate to the customer's certificate of defense requirements in conjunction with Defense Supplies Rating Orders.

Operation of the new procedure will be delayed until about Jan. 1, according to OPM officials in order that the Army and the Navy may complete their supply plans, looking to the formation of a critical materials pool. Arsenals and shipyards are not to be affected.

On the price control front, the week's developments made it appear almost certain that the price control bill, now pending in the House of Representatives, will include provisions for licensing dealers and others concerned with the products under price ceilings.

At the same time the Baruch plan for over-all ceilings on prices, wages and rents (see THE IRON AGE, Sept. 11, p. 85) appeared to be gaining adherents in both the House and the Senate. Despite the growing strength of opinion favoring the Baruch plan, it was doubted if sufficient force could be mustered in the time available to overcome support for the Henderson method of price control. As the measure stands, just before opening of full debate in the House, the selective plan, supported by Price Administrator Henderson, for fixing prices product by product as the demand arises, appears almost certain of adoption.

House members from farm states are still fighting for some form of wage control, but the strength of the administration's forces is believed sufficient to prevent any really effective wage controls being written into the measure.

Highlights of developments in prices and priorities in the past week follow.

Forest Service Given Rating

• • • **The OPM** has issued order P-45-a, assigning a preference rating of A-8 to deliveries of all equipment, tools and supplies to be purchased by the United States Forest Service order P-45-a. The rating may be extended to a manufacturer to orders for materials to be used in fire fighting equipment destined for the Forest Service, provided such materials appear on the current priorities Critical list.

The priorities rating may not be used by any manufacturer filling Forest Service orders who has sufficient material on hand to produce or deliver fire fighting equipment and still have a minimum working inventory, nor by any producer who can obtain the necessary materials without use of the rating.

Auto Replacement Parts

• • • **OPM Limitation** Order L-4. affecting production of replacement parts for passenger cars and light trucks, was amended last week to permit a producer to select either Jan. 1-June 30 or July 1-Dec. 31 as the base period on which to figure total production from Sept. 15 to the end of the year. The alternative base period was authorized because many producers have their heaviest output during the last half of the year. The original order provided that a spare parts producer may make

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during the Sept. 15-Dec. 31, 1941, period 60 per cent of the number of parts sold by him for replacement purposes during the Jan. 1-June 30, 1941, period.

May Freeze Auto Models

• • • **Permission to** use up existing stocks of bright finish or trim on passenger cars will be extended an additional 15 days to Dec. 31 and freezing 1942 passenger car models will be recommended by OPM's Automotive, Transportation and Farm Equipment Branch of the Division of Civilian Supply.

These announcements were made last week at a meeting with the passenger car sub-committee of the Automotive Defense Industry Advisory Committee.

By freezing 1942 models, it was stated, the necessity for retooling for 1943 models will be eliminated and critical materials for defense will be conserved.

The recommendation for an amendment to the order postponing the effective date after which use of bright work will be barred will contemplate that manufacturers can use up stocks finished or in process as of Oct. 27. If stocks still remain in inventory after Dec. 31 manufacturers can use them only if they are painted or treated in some manner so that they will lose their identity as bright finish permanently.

The branch has taken steps to exempt windshield wiper blade and arm assemblies, locks and lock covers, ventilator window latches and body trim screws for the provisions of the order.

Heat Treating Furnaces

• • • **Makers of furnaces** used for heat treating metals have been granted a rating of A-1-c for the acquisition of materials in order P-74. The preference rating has been granted to 50 manufacturers of furnaces, both electric and combustion, to be used for defense orders. Manufacturers and suppliers using the ratings are required to file Form PD-81 on or before the 15th of each month. The rating granted by the order applies only to specific materials listed in the order.

How to Get Extra Copies Of the Priorities Guide

• • • **Extra copies of the 12-page Allocations and Priorities Guide, which is furnished as a separate section of this issue, are available at these prices:**

1 to 10 copies .....25c. each
11 to 100 copies .....20c. each
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Please send orders to the Reader Service Dept., THE IRON AGE, 100 E. 42nd St., New York. To avoid small bookkeeping entries, will you kindly send stamps or coin with orders for one dollar or less.

(Earlier issues of THE IRON AGE Priorities Guide should be destroyed and be replaced by the new section appearing in this issue).

Titanium Pigments

• • • **Distribution of** titanium dioxide for use as pigment will be through a monthly allocation system in the future, according to the terms of preference order M-44 issued Nov. 21 by OPM. The order, effective Dec. 1, also sets up a pool for emergency use consisting of 20 per cent of each producer's daily production. Shortage of imports was said to be the cause of the order. Applications for allocations from the emergency pool should be made on OPM form PD-145. Users of titanium pigments are required to file form PD-146 with each producer or jobber with whom he deals covering his monthly requirements.

Tin and Lead Foil

• • • **Tin, lead or** composition foil may not be used in the manufacture of any decorative article or material or for the packaging of tobacco products, chewing gum, beverages, confections, ribbons machines, friction tape and photo-for typewriters and other business graphic film, according to the terms of limitation order L-25 issued Nov. 24 by OPM. Manufacture and sale of foil for any of these uses is prohibited after Jan. 15. Until that date foil may be manufactured in amounts limited to one-third the amount manufactured for the same purposes in the first three months of 1941.

Warehouses Warned on Circumventing M-21-b

Cleveland

• • • **It was revealed** here that on Nov. 11 J. R. Stewart of the Iron and Steel Branch of OPM took warehouses to task for "attempting to circumvent the provision of supplementary order M-21-b." In a letter addressed to all warehouses, Mr. Stewart stated that the practice is not universal. His letter said, in part:

"I refer in particular to that provision of Supplementary Order M-21-b which excludes from warehouse quotas shipments direct from a producer to a warehouse customer. This particular section of the order, as you know, was inserted to facilitate those transactions which occur infrequently where a carload buyer does not have a credit standing with a steel producer. In such cases, the warehouse is able to perform a valuable service to the customer by extending credit which could not otherwise be obtained. It is absurd, however, to think that the current practice of some warehouses in soliciting Army and Navy construction projects for carload orders to be placed with the mills for direct shipment falls in this category. It was not the intention of this office, to encourage steel warehouses to enter the brokerage business, thus building up the cost of the defense program.

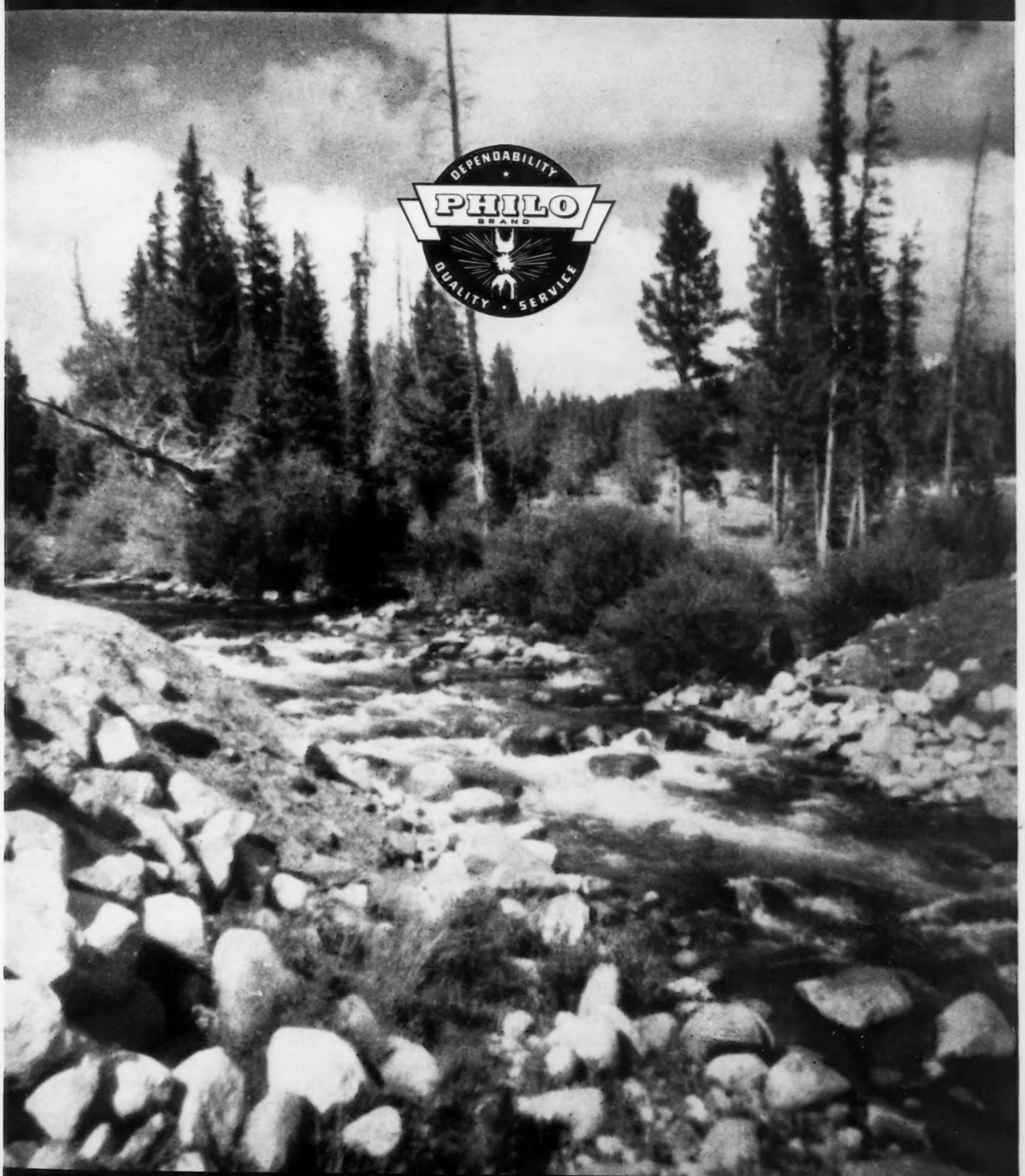
"We have also had called to our attention the practice of certain distributors whereby a warehouse will order a carload of steel for shipment direct to a customer although the steel is consigned in care of the warehouse. A follow up on a few transactions of this type has revealed that the material actually has gone into warehouse stock. This office is now in the process of obtaining full details of all such transactions that have come to our attention."

Priorities Aid Woodcarvers

Jamestown

• • • **Woodcarvers are in** demand again in this Western New York furniture manufacturing center as designers plan to substitute wood for steel and other metals which defense priorities have usurped.

TENSLEEP TROUT STREAM ON TOP OF TENSLEEP MOUNTAIN IN WYOMING — ELEVATION 9,965 FEET



Ohio Ferro-Alloys Corporation
Canton, Ohio

THIS WEEK'S

Priorities and Prices

Heat treatment furnace makers granted rating of A-1-c for acquiring needed materials in Order P-74 issued Nov. 22 (OPM:PM1625)

Southern pine lumber price schedule No. 19 amended Nov. 18, to bring freight car construction material under control. Other minor adjustments were also made. (OPA:PM1603)

Construction of an aluminum plant at Massena, N. Y., to be operated by Alcoa, will be expedited by granting of rating of A-1-b for necessary material under terms of Order P-19-b. (OPM: PM1604)

Zinc ceiling price schedule violations by a major producer and two dealers reported by OPA. Prices ranging from 16½c. to 17c. alleged to have been charged. (OPA:PM1615)

Iron and steel scrap price schedule violations charged to three more brokers and dealers by OPA. Announcement also warned that practice of upgrading was being investigated and that brokers and dealers may not collect commissions on scrap prepared and shipped from their yards. (OPA:PM1608)

Lead and tin foil use for protecting cigarettes, chewing gum, candy, typewriter ribbons, beverages, friction tape, etc., prohibited by limitation Order L-25 issued Nov. 24. (OPM:PM1620)

Titanium pigments placed under full priority control in Order M-44 issued Nov. 21. Order sets up a pool for emergency needs. (OPM: PM1627)

U. S. Forest service given priority rating of A-8 for equipment, tools and supplies to be used for fighting or preventing fires in Order P-45-a issued Nov. 22. (OPM:PM1613)

Paraffin wax price maximums established in schedule No. 42 issued Nov. 21 (OPA:PM1624)

Hardships resulting from base period established under Order L-4 covering replacement parts for cars and light trucks to be relieved by new amendment issued Nov. 22. (OPM:T49)

Formaldehyde and synthetic resin preference Order M-25 amended Nov. 17 to permit use of material for radio tube bases and molded radio cabinets under specified conditions. (OPM:PM1596)

Passenger automobile production for February, 1942, to be restricted to 43.9 per cent of output of February, 1941. (OPM:PM1611)

Automobile industry given additional 15 days to use up existing stocks of bright trim. Effective date postponed to Dec. 31 from Dec. 15.

Heating and refrigeration coil and allied product manufacturers to discuss restrictions on further price increases with OPA on Nov. 24. (OPA:PM1623)

Railroad freight and passenger cars, locomotives, and maintenance of way and signal equipment makers requested not to increase prices above levels of Oct. 1. (OPA:PM1621)

★ ★ ★

For copies of above announcements address defense agency concerned, at Washington, giving announcement number as shown in parentheses after each paragraph (For example, OPM:PM1500 *means announcement* 1500 *issued by Office of Production Management.)*

New Edition Issued On Plating Solutions

• • • **A new edition** (the sixth) of a 48-page booklet giving in detail, simple and practical methods of analyzing plating solutions has been published by the Hanson-Van Winkle-Munning Co., Matawan, N. J., manufacturers of electroplating equipment and supplies.

A new section is included, "Electrochemical Data for the Important Metals." A detailed description is given, with examples, of methods of determining the thickness of deposits at various plating times and current densities. Another useful table gives the factors for the conversion of weights of metals into thickness and vice versa.

OPA Hits at Sales Of Rejected Steel

Pittsburgh

• • • **Progress is being** made by OPA toward eliminating the practice by some concerns of selling rejected steel products at prices exceeding the ceiling level for regular material.

While such practices are believed to involve only a small percentage of total steel sold, it is understood OPA has been quietly making investigations for some time and is prepared to act if the situation is not cleaned up immediately. The OPA, it is understood, has emphasized repeatedly that the iron and steel price ceiling applies to all products made by steel companies, whether such material is rejected for specific orders or not.

Bethlehem to Release Back Pig Iron Allocations

Philadelphia

• • • **Bethlehem Steel Co.,** it was reported this week, was instructed to release the pig iron that was allocated for September, the deliveries of which were withheld at that time. The release of the metal is expected to give consumers a more comfortable working stock than they have had for some time.

One of the Bethlehem blast furnaces at Steelton was reported this week placed on Silvery Mayari iron, a special high silicon iron used in the manufacture of pressure vessels and other similar commodities. It was indicated a few weeks ago that consumers' stocks of this metal and also Standard Mayari were extremely low.

$77,200,000 Worth of Tools Shipped in October

Cleveland

• • • **Machine tool shipments** rose to $77,200,000 in October as compared to $68,700,000 in September and $64,300,000 in August, the National Machine Tool Builders' Association reports. In October a year ago shipments were estimated at $49,000,000. The October shipments indicate that the industry will exceed its announced goal of $750,000,000 in 1941.

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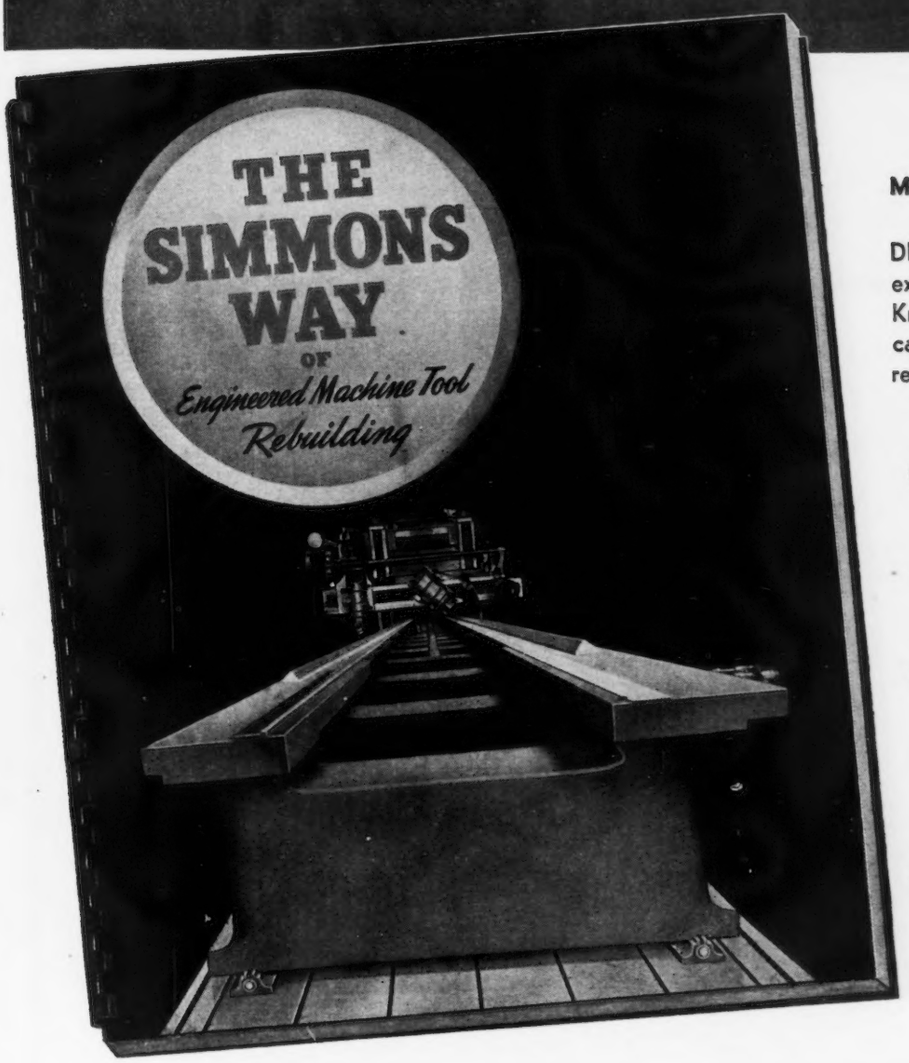

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A request on your company letterhead will place it on your desk.

SEND FOR IT *To-day*

SIMMONS ENGINEERED *Machine Tool* REBUILDING

SIMMONS MACHINE TOOL CORP.
1721 NORTH BROADWAY, ALBANY, N. Y.

OPM Announces New Form for Material

PD-25 A
(11/12/41)

OFFICE OF PRODUCTION MANAGEMENT
DIVISION OF PRIORITIES
WASHINGTON, D. C.

[SPECIMEN]

DO NOT USE

Co.					
Ind.					
St.					
P. N.					
Per					

APPLICATION FOR PRIORITY ASSISTANCE UNDER PRODUCTION REQUIREMENTS PLAN

For Calendar Quarter January–March 1942

Submit five copies

Read instructions in Section A carefully before filling out Form

(Name and address of applicant) (Department, division, or plant)

Section B.—Classes of products manufactured by Applicant for which application is made.

Attach a catalog or other complete description of classes of products.

Show below number of units and dollar volume of shipments of each class of products for periods shown.

Description of Classes of Products (1)	Leave Blank (2)	Unit of Measure (3)	Calendar Quarter July-Sept. 1941 (Actual) (4)		Calendar Quarter Oct.-Dec. 1941 (Estimated) (5)		Calendar Quarter Jan.-Mar. 1942 (Estimated) (6)		Quarter Ending on Date Used in Section C-4 Below (7)	
			Units	Dollar Value	Units	Dollar Value	Units	Dollar Value	Units	Dollar Value
Total		x x x	x x x		x x x		x x x		x x x	

Section C.—Inventory report covering classes of products included in Section B.

Show below total dollar value of inventory on dates shown.

Inventory (1)	June 30, 1941 (2)	September 30, 1941 (3)	Date of Most Recent Physical Inventory (Give date) ..... (4)
Raw Materials			
Work in Process *			
Finished Goods *			
Supplies			
Other			
Book Total of above			

State basis used in determining values .....

*Indicate whether labor and overhead are included in values reported: .....

Section D.—Report of analysis of total dollar volume of shipments of classes of products included in Section B.

Show below in Col. (b) dollar volume of shipments for each classification shown in Col. (a).

Part 1.—Classification by Preference Ratings

Covering period beginning....., ending.....

Item	Classification (a)	Dollar Volume (b)	Percent of Total Dollar Volume (c)
	Preference Ratings:		
1	AA		
2	A-1-*a*		
3	A-1-*b*		
4	A-1-*c*		
5	A-1-*d*		
6	A-1-*e*		
7	A-1-*f*		
8	A-1-*g*		
9	A-1-*h*		
10	A-1-*i*		
11	A-1-*j*		
12	A-2		
13	A-3		
14	A-4		
15	A-5		
16	A-6		
17	A-7		
18	A-8		
19	A-9		
20	A-10*		
	Other Orders Provided for in Priorities Division Regulation Number 1:		
21	Army and Navy		
22	U. S. Govt. Agencies. (See *i*)		
23	Foreign Govts. (See *ii*)		
24	Lend-Lease. (See *iii*)		
	Other Classifications:		
25	PD-25C—Defense		
26	PD-25C—non-Defense		
27	All B Ratings		
28	Known to be non-Defense		
29	Defense status undetermined		
30	Total Shipments		100%

*Include in Item 20 only shipments supported by Preference Rating Certificates, Preference Rating Orders, or properly endorsed Purchase Orders, in possession of applicant.

Part 2.—Classification by Industry or End Use

Covering period beginning....., ending.....

Item	Classification by Industry or End Use (a)	Dollar Volume (b)	Percent of Total Dollar Volume (c)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15	All other not classified		
16	Total Shipments		100%
17	Shipments to distributors, wholesalers, jobbers, dealers (included above)		

Footnotes for Part 1—Items 22, 23, 24

(*i*) The United States Maritime Commission, the Panama Canal, the Coast and Geodetic Survey, the Coast Guard, the Civil Aeronautics Authority, the National Advisory Commission for Aeronautics, the Office of Scientific Research and Development.

(*ii*) The *government* of any of the following countries: The United Kingdom, Canada, and other Dominions, Crown Colonies and Protectorates of the British Empire, Belgium, China, Greece, The Kingdom of the Netherlands, Norway, Poland, Russia, and Yugoslavia.

(*iii*) Any contract or order placed by *any agency of the United States Government* for material or equipment to be delivered to, or for the account of, the *government* of any country other than those listed above, (including those in the Western Hemisphere) pursuant to the Act of March 11, 1941, entitled "An Act to Promote the Defense of the United States," (Lend-Lease Act).

ORIGINAL

16—34718-1

Needed for Defense and Essential Civilian Work . . .

PD-25 A
(11/21/41)

[SPECIMEN]

(Name and address of applicant) (Department, division, or plant)

SECTION E.—Report of all materials shown on Materials List No. 1 incorporated in products included in Section B

DESCRIPTION OF MATERIALS ON MATERIALS LIST NO. 1 (1)	LEAVE BLANK (2)	UNIT OF MEASURE (3)	STATEMENT FOR QUARTER ENDING SEPTEMBER 30, 1941				QUARTER ENDING MARCH 31, 1942		
			Inventory on June 30, 1941 (4)	Received During Quarter (5)	Used During Quarter (6)	Inventory on Sept. 30, 1941 (7)	Total Anticipated Requirements (8)	Estimated or Actual Value of (8) (9)	Leave Blank (10)
TOTAL,	xxx	xxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx		xxxxx

ORIGINAL

(Page two of three)

16—34718-1

PD-25A
(11/12/41)

[SPECIMEN]

(Name and address of applicant) (Department, division, or plant)

SECTION F.—Report of other materials incorporated in products included in Section B for which preference rating is requested

DESCRIPTION OF OTHER MATERIALS NOT ON MATERIALS LIST NO. 1 (1)	LEAVE BLANK (2)	UNIT OF MEASURE (3)	STATEMENT FOR QUARTER ENDING SEPTEMBER 30, 1941				QUARTER ENDING MARCH 31, 1942		
			Inventory on June 30, 1941 (4)	Received During Quarter (5)	Used During Quarter (6)	Inventory on Sept. 30, 1941 (7)	Total Anticipated Requirements (8)	Estimated or Actual Value of (8) (9)	Leave Blank (10)
TOTAL,	xxx	xxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx		xxxxx
SECTION G.—Report of supplies:									
Total (Maintenance, Repair, Operating)	xxx	Dollars							
SECTION H.—Total materials and supplies to be purchased	xxx	Dollars	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx		xxxxx

CERTIFICATION

The undersigned hereby certifies to the Director of Priorities that:

(1) He executed the foregoing application on behalf of and by authority of the above-named Applicant;

(2) The facts stated above are, to the best of his knowledge and belief, true and correct;

(3) The estimates of requirements of Materials, and Supplies, shown in Column 8 of Sections E, F, and G, have been arrived at from the books and records of the Applicant and have been determined in a reasonable and prudent manner;

(4) The quantities and values of materials shown in Column 8 of Sections E and F are to be physically incorporated in, or transported with, the classes of products included in Section B.

(5) All materials on Materials List No. 1 incorporated or to be incorporated in the products listed in Section B for the periods indicated have been included in Section E.

(6) If preference ratings are assigned under the Production Requirements Plan, no preference ratings other than those assigned under this Plan will be used by the Applicant to obtain deliveries of production materials, maintenance, repair, and operating supplies, unless specific authorization by the Director of Priorities is received through the Production Requirements Plan Section;

(7) The dollar volumes included in items 1 through 20 of Section D, Part 1, are supported by preference rating orders, preference rating certificates, or purchase orders carrying proper endorsements, which are in the possession of the Applicant;

(8) The materials obtained with the assistance of ratings assigned under this Plan will be used only in the manufacture of classes of products included in Section B.

(Date) (Signature and title of official)

Section 35(a) of the United States Criminal Code, 18 U. S. C. A. 80, makes it a criminal offense to make a false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

AUTHORIZATION

Pursuant to Preference Rating Order P ..... and on the terms and conditions therein set forth, the Director of Priorities of the Office of Production Management hereby assigns the Preference Rating or Ratings shown below to deliveries in the Quarter ending March 31, 1942, of only the quantities or values of Materials and Supplies shown in Column 8 of Sections E, F, and G as they may be modified in Column 10.

PREFERENCE RATING	ASSIGNED TO—

Preference Rating Order No. .....

Director of Priorities. Serial No. ..... (Date)

ORIGINAL

(Page three of three)

16—34761-1

• • • **Designed to** enable a manufacturer to present a complete picture of his defense operations and to make known his production requirements for this work in greater detail, the form PD-25-a, published on these pages, requires the finest breakdown of operations yet called for by the OPM. Officially, the breakdown required is said to be the smallest that existing inventory records will permit.

This form, for use with the new Production Requirements Plan, sets up quarterly blanket ratings covering essential civilian as well as defense manufacturers and extends to maintenance, repair and operating supplies. See page 90 for further details of the plan.

The form which becomes effective for first quarter supplies, calls for information on operations last July, August and September. The earlier it is submitted, the earlier the priority assistance will be granted.

Sections of form PD-25-a are reproduced here only for the information of industry. (Revisions in this form may be made by OPM before the plan becomes effective.) Copies of the form itself may be obtained from the Division of Priorities, Office of Production Management, Washington. The original form may be reproduced only in its original form, size and phraseology.

Assembly Line

(CONCLUDED FROM PAGE 64)

about 17,000 feet, but it is understood that the supercharging of these engines gives them fighting performance at nearer 30,000 feet. Top speed is supposed to be in the 400 mph. range.

Prevention of bearing failures in airplane engines is being aided by use of a new and secret process for inspection of the bond between the bearing surface material and the backing shell. Existence of the inspection method has been revealed by F. C. Kroeger, GM vice-president and the general manager of Allison division of GM. Disclosure was made after the Air Corps had given permission for Allison to inspect bearings in all its engines now in the hands of airplane manufacturers. In the past, only tests to destruction on samples—a percentage of each lot of bearings—could be made to test efficiency of the bond. The new process, making possible the minute inspection of each bearing produced, will be made available for use by other manufacturers designated by the Air Corps.

Slowness with which the Martin-bomber program is getting underway here in several plants has been attributed to major redesign of that plane. The Martin medium bomber, after its initial tests, was pronounced one of the fastest of its type in the world, but now it has been decided that its landing speed is at least 15 m.p.h. too fast for reasonable safety, and the redesign is being done partly to reduce the landing speed considerably under its rumored 110 m.p.h. In addition, defensive firing power is being increased, blind spots — unprotected areas—are being eliminated, and important changes in riveting procedure are planned.

Lifting is important in production . .

. . . AND IN THE WORDS "SHAW-BOX CRANES" IS ALL OF LIFTING IN RANGES FROM 500 LBS. TO 450 TONS

Shaw-Box cranes are lifting a huge share of the materials and equipment and effectively speeding up all-out defense production. Speed in handling, convenience, dependability and economy are a few of the basic reasons for specifying "SHAW-BOX" cranes.

Reliable, low cost crane service depends upon modern design and proved special features that are only evolved out of the experiences of years.

CONSIDER THESE 8 FEATURES OF THE SHAW-BOX TYPE S CRANE—IN NO OTHER CRANE CAN YOU GET ALL OF THESE ENGINEERING ADVANTAGES.

1. All Steel "ShaWeld" Construction
2. Anti-friction Bearings
3. Direct Bridge Drive
4. Rotating Wheel Axles
5. Taper Tread Wheels
6. "ShaWeld" Gears
7. Hydraulic Bridge Brake
8. Oil bath operation of all parts.

You do not pay extra for these modern features which are found only in SHAW-BOX CRANES. That's why, for the work they do, they are the least expensive to buy and use.

Send for catalog with complete information, illustrations, dimensions and specifications. Make us prove economy of installation by allowing us to quote on your crane requirements. SHAW-BOX CRANES themselves will prove their low operating cost and speedy, adaptable service.

SHAW BOX CRANE & HOIST DIVISION
MANNING, MAXWELL & MOORE, INC.
MUSKEGON · · MICHIGAN

Automobile Model Freezing Already Under Way in Detroit

Detroit

• • • **Announcement by** OPM that it would recommend freezing of 1942 models came as no surprise to Detroit. General Motors Corp. had made formal announcement many months ago of intention to freeze 1942 designs. The company would not have done so without assurance of some sort that competition would fall in line. It has been taken for granted in the automotive world that the industry would skip 1943 models. Design departments are not engaged in 1943 designs.

Lifting of the bright work ban for two weeks, to Jan. 1, appears to be a formal fact and further easing of the ban is expected before it becomes effective. Probably the most retrogressive idea to come out of Washington is a recommendation that the industry consider some basic engineering changes, including a reduction of the compression ratio of engines to permit them to use lower octane fuels. Necessity for the idea hasn't been established and some observers here think that it is probably no more than a "trading point" in the OPM recommendations which will be discussed in the near future in conferences between the industry and OPM.

Government Awards . . .

War Dept., Air Corps:

Alloy Rods Co., York, Pa.; iron and steel welding rods $19,191
American Chain & Cable Co., Inc., Monessen, Pa.; iron and steel welding rods 31,195
American Steel & Wire Co., Cleveland; iron and steel welding rods 9,468
Burdett Oxygen Co. of Cleveland, Inc., Cleveland; iron and steel welding rods 10,351
Haynes Stellite Co., Kokomo, Ind.; iron and steel welding rods ... 7,800
Hollup Corp., Chicago; iron and steel welding rods 1,186
Lake Erie Engineering Corp., Buffalo; hydraulic presses 34,380
The Linde Air Products Co., New York; iron and steel welding rods 1,944
Star Brass Mfg. Co., Boston; pressure gage testers 79,230
United Aircraft Corp., Hamilton Standard Propellers Division, East Hartford, Conn.; propeller blade assemblies 257,038

War Dept., Corps of Engineers:

S. W. Flamm Supply Co., New York; stoves and pipe 13,780
W. V. Griffin and H. W. Purvis, Receivers of Georgia and Florida R. R., Augusta, Ga.; railroad trackage, Valdosta Airfield between Bemiss and Barretts, Ga. 21,200
Lawrence Construction Co., Sacramento, Cal.; control tower, Salinas Airport, Salinas, Cal. .. 10,491
V. P. Serodino, Cincinnati; scrapers 3,384
David Smith Steel Co., Inc., Brooklyn; iron 25,017
S. Morgan Smith Co., York, Pa.; 2 turbines with accessories, Denison Dam Power Plant, Denison, Texas 1,134,801

War Dept., Medical:

American Sterilizer Co., Erie, Pa.; orthopedic and x-ray tables $821
George P. Pilling & Son Co., Philadelphia; nasal forceps and rib shears 5,097
Standard X-Ray Co., Chicago; x-ray machines 1,400
Union Broach Co., Inc., New York; pliers 2,250

War Dept., Chemical Warfare Service:

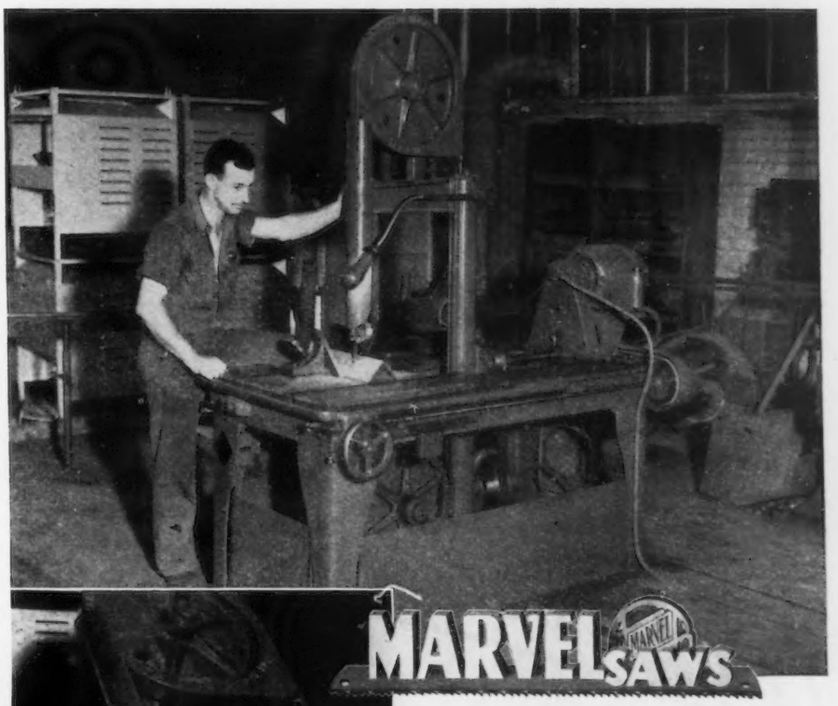
American Seating Co., Grand Rapids, Mich.; canister bodies $230,120
L. A. Benson Co., Inc., Baltimore, Md.; gages 580
Burt Mfg. Co., Akron, Ohio; ventilators and shutters 1,579
Carey Machinery & Supply Co., Baltimore; lathes 1,771
Wm. Christensen Co., Inc., York, Pa.; hoisting apparatus, trolley hoists and hoist slings 34,441
Continental Can Co., New York; canister assemblies 11,578
Doehler Die Casting Co., New York; elbow nozzles 11,356
Eureka Vacuum Cleaner Co., Detroit; brass ferrules 19,893
Manhattan Perforated Metal Co., New York; brass 56,000
Jas. H. Matthews & Co., Pittsburgh; shell stencils and shields 4,737
Chas. Mundt & Sons, Jersey City; brass 124,771
United-Carr Fastener Corp., Cambridge, Mass.; buttons and washers 2,360

War Dept., Quartermaster Corps:

Cohn & Rosenberger Co., Providence; silver bars $13,563
Ford Motor Co., Dearborn; trucks, 1½-ton 8,845
General Motors Sales Corp., Chevrolet Division, Detroit; spare parts for automobiles 3,450
General Motors Truck & Coach Division, Yellow Truck & Coach Co., Pontiac, Mich.; parts for trucks 222,387
Kienzle & Merrick Mfg. Co., Shakopee, Minn.; grates 21,200
New Monarch Machine & Stamping Co., Des Moines, Iowa; tent stoves 61,000
Oakland Foundry Co., Belleville, Ill.; grates 12,000
Robbins Co., Attleboro, Mass.; badges 19,800
Uncas Mfg. Co., Providence; badges 12,456
Wheeling Corrugating Co., Wheeling, W. Va.; tent stoves 55,000

War Dept., Air Corps:

Aluminum Co. of America, Washington; aluminum-foil, rod sheet, etc. $67,401
aluminum rivets 115,725
Bendix Aviation Corp., Eclipse Division, Bendix, N. J.; pump assemblies 142,500
parts for airplanes 340,650



MARVEL SAWS

Mitering a structural angle iron—with a MARVEL No. 8. The blade is fed into the work. Work is held stationary on the bed in quick action vise.

Shipbuilding calls for Universal tools.

There's a lot of sawing—cutting-off, mitering notching and special cuts wherever ships are being built, and work comes in all sizes too. That's why you'll find MARVEL No. 8 Metal Cutting Band Saws in shipyards and Navy yards, as well as in tool rooms and die shops.

The MARVEL No. 8 is the most universal sawing machine built. It will snip off an ⅛" drill rod or cut off an 18" x 18" structural shape with equal efficiency, or will save hours of machining by roughing work to size and shape. It will cut at any angle from 45° right to 45° left, has a large "T"-slotted table (for holding irregular shapes, special fixtures, etc.) and both power and hand feeds. It is a busy machine wherever found, for it does so many different jobs and does each one well.

ARMSTRONG-BLUM MFG. CO. *"The Hack Saw People"*
5700 Bloomingdale Ave., Chicago, U. S. A. Eastern Sales: 225 Lafayette St., N. Y.

GOVERNMENT AWARDS

J. I. Case Co., Racine, Wis.; tractor-mowers 261,562

Consolidated Aircraft Corp., San Diego, Cal.; parts for airplanes. 471,514

Curtiss-Wright Corp., Curtiss Propeller Division, Caldwell, N. J.; propeller assemblies 165,865
parts for propellers 431,141

Fairmont Aluminum Co., Fairmount, W. Va.; aluminum-foil, rod sheet, etc. 36,513

Jack & Heintz, Inc., Cleveland; equipment assemblies 4,525,650

Johnson Tin Foil & Metal Co., St. Louis; aluminum-foil, rod sheet, etc. 594

Link Aviation Devices, Inc., Binghamton, N. Y.; parts for airplanes 86,833

Revere Copper and Brass, Inc., Detroit; brass, bronze and copper. 139,486

United Wire & Supply Corp., Cranston, R. I.; aluminum-foil, rod sheet, etc. 42,233

Wittek Manufacturing Co., Chicago; hose clamps 75,801

An Assist! By ATLAS

View at Prominent Iron Foundry

To Lower Costs!

Here Atlas - designed, Atlas - built equipment moves heavy scrap and other charging materials with consummate ease.

Monorail deposits empty bucket on roller conveyor. Bucket *rolls down* to scale platform, is charged with iron, weight read from yard crane cab. Scale platform lowers, turns, bucket *rolls down* to monorail for pick-up and charge to cupola.

A propitious circle, presaging profit at the year-end—and a definitely typical Atlas installation.

THE ATLAS CAR & MFG. CO.

Engineers **CLEVELAND, OHIO** ***Manufacturers***

serving the world with mobile handling equipment

Foundry Equipment Sales Hit New High in October

• • • **Sales of foundry** equipment in October reached a new high, according to the index compiled by the Foundry Equipment Manufacturers Association. The October index was reported at 403.8, as compared with 363.8 in September and 377.2 in April, the latter being the previous high for this year.

The index's rise in October was due entirely to sales of new equipment. A sub-index covering only new equipment rose to a new high of 414.2 for the month, as compared with 372 in September, while another sub-index covering only repairs dropped from 339.2 in September to 327.2 in October.

Manganese Ore Output Rises During September

Washington

• • • **Domestic** production and shipments of manganese ore containing 35 per cent or more manganese (natural) during September, 1941, were 9400 gross tons each, and producers' stocks at the end of the month were 1200 tons, according to the Bureau of Mines. These figures are predicated on reports received from producers that accounted for 84 per cent of the total in 1940. In August, 1941, production was 9100 tons, shipments were 9000 tons, and producers' stocks at the end of the month were 1200 tons. The rate of shipments averaged 3344 tons monthly in 1940, when the total amounted to 40,123 tons.

Republic Enlarging Gadsden Open Hearth

Gadsden, Ala.

• • • **Republic Steel Corp.** is engaged in enlarging No. 2 open hearth furnace at its Gulfsteel Division here from 90 to 125 tons as the final step in an expansion program started at Gulfsteel two years ago. No. 2 furnace is expected to be returned to production between Dec. 1 and 15. With completion of this enlargement, Republic will have six 125-ton open hearth furnaces here and two furnaces of 150-ton capacity.

PERSONALS . . .

• **J. H. Watters** has been named president of Union Asbestos & Rubber Co., Chicago, succeeding **L. L. Cohen,** who was elected chairman of the board of directors. Mr. Watters started his business career with Watters & Martin Wholesale Hardware Co. in 1905 and had been with them continuously until 1925. In 1926, Mr. Watters became vice-president and manager of sales of the New York Air Brake Co. and remained there until 1929 when he became president and general manager of the Marion Steam Shovel Co., Marion, Ohio.

• **R. V. Mann,** who has been assistant to the president of the Carpenter Steel Co., Reading, Pa., has been named general sales manager. A graduate of Stevens Institute of Technology, Mr. Mann joined the Carpenter organization in 1911. After six years in various departments of the mill, he resigned in 1917 to enter the United States Army. Following two years of service as a captain in the ordnance department, he returned to civilian life as district sales manager for Peerless Drawn Steel Co. at Cincinnati, and later at Chicago. In 1925, he returned to Carpenter as assistant to the president, in which capacity he supervised the sales of stainless steel.

O. V. Greene, assistant metallurgist of the Carpenter Steel Co., has been appointed manager of tool steel sales. Mr. Greene has been associated with the company since 1928, and was a metallurgist with the Reading Railroad Co. before joining the steel company.

• **Henri B. Vidal** has been appointed manager of the Buffalo sales office of Westinghouse Electric & Mfg. Co., to succeed **John H. Spraggon,** who has been promoted to eastern district central station manager in New York.

• **Cliff Bendle,** sales engineer with Crobalt Inc. since its establishment in 1932, has been appointed sales manager. His headquarters will be at the new Crobalt plant in Ann Arbor, Mich.

• **Robert J. Howison** has been made sales manager of the automotive division, Morse Chain Co., Detroit. Mr. Howison has been associated for more than 20 years with the industry, making silent and roller chains. He has been active in sales, sales engineering and application of timing chains for internal combustion engines.

• **Norman E. Donnelly** has been appointed marine sales manager of the Buda Co., Harvey, Ill. Mr. Donnelly was with the Caterpillar Tractor Co. for seven years as its eastern engine sales manager. Prior to his association with the Caterpillar company, he was a partner in the Dawn Boat Corp., New York.

• **D. Clark Matthews** is the new Southern Ohio representative of the Cowles Detergent Co., Cleveland. Mr. Matthews is an electrochemist and acquired his early experience in the field as an elctroplater. More recently, he was a technical consultant on metal working and finishing processes.

• **Holcombe Parkes,** associate director of public relations of the Association of American Railroads at Washington, and former editor of the Norfolk & Western Magazine and manager of the advertising department of the Norfolk & Western Railway, has been appointed assistant to the president of the Southern Railway System, Washington, in charge of the railroad's public relations activities.

• **L. E. Cooney,** since 1924 associated with the Chicago sales organization of the Carpenter Steel Co., Reading, Pa., is now district

J. H. WATTERS, president of Union Asbestos & Rubber Co., Chicago.

R. V. MANN, assistant to the president, and O. V. GREENE, assistant metallurgist, Carpenter Steel Co., Reading, Pa.

sales manager for that company at Chicago. He succeeds the late John B. Guthrie.

• **R. C. Dalzell,** technical advisor of the Baltimore division of Revere Copper & Brass Inc., has been elected president of the Baltimore Alumni Association of Tau Beta Pi, honorary engineering fraternity.

• **H. B. Pickering,** former engineering executive with the A. O. Smith Corp., Milwaukee, and for the past four years chief engineer of the United States Plywood Corp., has been made manager of the Savannah Shipyards, Inc., in charge of its Savannah yard where a $20,000,000 contract with the maritime commission for 10,000-ton ships is being executed.

• **Robert Grant,** former executive vice-president of the Fuller-Johnson Corp., Detroit, has joined the Young Radiator Co., Racine, Wis., as production manager.

• **George J. Haislmaier** has been made sales manager of the contract products division of the Young Radiator Co., Racine, Wis. He graduated from Marquette University, Milwaukee, College of Engineering and has been with the Young firm since 1936.

• **Robert B. Wolcott** has been appointed manager of sales, New York office of the South Chester Tube Co. He has been a sales representative with the South Chester Tube Co. in New York for over 15 years.

• **H. H. Budds** has joined the Ranger Aircraft Engines division of Fairchild Engine & Airplane Corp., Farmingdale, L. I. Mr. Budds goes to Ranger from the Briggs Aviation Corp., Detroit, where he had been for 20 years in the automotive and aviation fields. His experience with the company included five years as manufacturing manager of the Briggs English division.

• **C. E. Herington** has been appointed sales director of a newly created sales service department established by the Meehanite Research Institute of America, Inc., Pittsburgh, to provide assistance in the solution of current and future selling problems encountered

C. E. HERINGTON, sales director, Meehanite Research Institute of America, Inc., Pittsburgh.

by Meehanite manufacturers in the United States and Canada. Mr. Herington, formerly advertising manager, will continue to supervise Meehanite promotional activities.

• **George Tharratt** has been appointed chief engineer of Adel Precision Products Corp., Burbank, Cal. **Lynn Reynolds,** formerly chief engineer, has been made vice-president and production manager. For the past three years, Mr. Tharratt has been head of the production and illustration department of Douglas Aircraft Co. In this capacity he originated the technique of illustrating each manufacturing and production operation to simplify the work and make it easier for new and inexperienced mechanics to quickly learn to handle aircraft jobs satisfactorily. He has spent over 25 years in aircraft construction, operation and maintenance. In 1920 he joined Blackburn's Airplane Co. of Brough, England. In 1926 he became a project and design engineer for Short Brothers of Rochester, England, where he applied experience as a marine engineer to the manufacture of flying boats. Later, he joined Canadian Vickers as chief engineer at Montreal where more flying boats were built. In 1930 he was selected by the Glenn L. Martin Co. of Baltimore, Md., as a design engineer for the first of the China Clippers. Going to California, he was first associated with North American Aviation Co. and later with Douglas Aircraft Co.

• **O. W. Young** has been named executive assistant to Harlow H. Curtice, general manager of the Buick Motor division, General Motors Corp. The post is a new one created to co-ordinate all Buick manufacturing operations, both automotive and defense, and Mr. Young, former general manufacturing manager, will be in charge of all manufacturing. Other important changes include the naming of **W. M. Larke,** formerly general superintendent, to the post of manager in charge of all Flint operations; **B. H. Newell,** formerly assistant general superintendent, to general superintendent in charge of automobile production; **A. R. Middleton,** formerly superintendent of the sheet metal plant, to assistant general superintendent of automobile production. Succeeding Mr. Middleton as superintendent of the sheet metal plant is **James Langford,** formerly night superintendent of that manufacturing department. **Fred Letts,** for the past several months in charge of aviation engine manufacturing operations in Buick's Flint plants, has been made general superintendent of all Buick defense production in Flint, both on Pratt & Whitney operations and on other defense production, including tanks. **Fred W. Moore,** superintendent of the Buick tool room, becomes assistant general superintendent of the defense operations. He is succeeded in the tool room by **Norman Harvey,** formerly assistant, as superintendent. **Henry Jackson** has been named assistant tool room superintendent. **Fred Pyper,** master mechanic, has been made general master mechanic, and **Homer Schultz,** formerly assistant master mechanic, now is master mechanic of all Flint operations. He will be assisted by **James H. Nelson. John A. Holik,** formerly assistant superintendent of the axle plant, has been named to a new post in charge of tank manufacture, while **F. W. Hertrich** is appointed divisional engineer of tank manufacture, and **Stephen A. Bendure,** has been named chief inspector of this division. **Frank A. Henny,** formerly general foreman in the axle division, becomes assistant superintendent of the tank

production. **Carl A. Savage** has been named assistant superintendent of the axle plant, replacing Mr. Holik.

• **H. A. Campbell,** research engineer of the Solar Aircraft Co., San Diego, Cal., has been appointed by the OPM to serve on the Technical Advisory Committee to deal with specifications for aeronautical steels.

• **L. E. Earnest,** production control manager of the Solar company, has been named a member of the resistance welding committee of the Engineering Foundation, which is sponsored by the American Welding Society and the American Institute of Electrical Engineers to standardize resistance welding in the aircraft industry.

• **Arthur F. Johnson,** formerly of Silverton, Colo., has joined the staff of the Reynolds Metals Co. at Listerhill, Ala. Mr. Johnson will be connected with the smelting division of the aluminum plant of the Reynolds company. He was formerly in charge of the development program of the Silver Lake Mine in Silverton, going there from West Australia, where he was employed by the American Smelting & Refining Co.

• **Oscar F. Tangel** has been added to the technical staff of Battelle Memorial Institute, Columbus, Ohio. He has been assigned to the division of materials beneficiation where investigations of coal preparation and ore concentration methods are in progress. Mr. Tangel has had a wide experience as metallurgical engineer with several metal mining companies in the Western states. He is a graduate of Lafayette College and the Montana School of Mines and has studied in Germany.

• **I. A. Billiar** has been appointed works manager in charge of all manufacturing of the Morris Machine Works, Baldwinsville, N. J. Mr. Billiar had been works manager of Standard Steel Works and later was connected with Continental Roll & Foundry Co. and the Pennsylvania Forge Corp.

• **L. F. Reinartz,** works manager of the American Rolling Mill Co., Middletown, Ohio, has been elected a director of the American Institute of Mining and Metallurgical Engineers.

• **Robert McKeown** and **Charles V. Allen** have been named district representatives of the new Eastern sales office of the Keystone Carbon Co., St. Marys, Pa., at 249 High Street, Newark, N. J.

• **Paul S. Ellison** has been elected to membership on the board of directors of the Association of National Advertisers at the annual fall meeting held in Hot Springs, Va. Mr. Ellison was recently promoted to the position of director of advertising of the Hygrade Sylvania Corp., New York.

• **Paul M. Lockwood** has been appointed general sales manager of the Kron Co., Bridgeport. Mr. Lockwood has for several years been a member of the managerial staff of Worthington Pump & Machinery Corp., of Harrison, N. J., serving under C. E. Wilson, vice-president in charge of Carbondale Air Conditioning & Refrigeration Division.

• **Clifford E. Ives,** former manager of the Milwaukee branch of the OPM, has been appointed Wisconsin director. His place as Milwaukee director is being taken by **H. D. Page** of the Mechanical Sales & Engineering Co., Milwaukee.

• **Russell L. Packard,** director of foreman training, Packard Motor Car Co., addressed a meeting of the National Office Management Association on Nov. 18 in the Packard Aircraft Engine office building, Detroit. Mr. Packard has been active for 23 years in training employees. He discussed methods of selecting and training with emphasis on the importance of the office supervisor's job in defense.

• **F. G. Flocke,** of the development and research division of the International Nickel Co., Inc., New York, gave a talk, on "Monel, Nickel and Inconel—Their Properties and Fabrication" before the New York-Central Pennsylvania section of the American Welding Society, on November 21, at the Yorktown Hotel, York, Pa.

OBITUARY . . .

• **Carl C. Brown,** retired Birmingham district sales manager for Republic Steel Corp., died Nov. 14 at his home in Birmingham, aged 57 years. Mr. Brown, a native of Atlanta, Ga., was sales manager for Gulf States Steel Co. from 1908 until that company was merged with Republic in 1937. At that time he became district sales manager for Republic, a position from which he retired in February, 1940, because of ill health.

• **Arthur F. Case,** manager of the coal and ore department of Wellman Engineering Co., Cleveland, died Nov. 7, aged 65 years. Mr. Case, who was with the Wellman company for 40 years, was the inventor of the rotary car dumper, and recently received a Modern Pioneer of American Industry award, presented by the National Association of Manufacturers, for his invention.

• **Charles Peterson,** superintendent, Merritt-Chapman & Scott Corp., marine contractors, died in Cleveland, Nov. 9. He had been superintendent of the company for seven years and was formerly vice-president and general manager of Charles H. Strong & Son Co., marine contractors, for 20 years. He was 57 years old.

• **William O. Steel,** New York representative for the Carpenter Steel Co., Reading, Pa., died suddenly Nov. 4. He joined the company 30 years ago in the New England territory, and became associated with the New York office in 1912.

• **Lawrence Blakely,** power superintendent at the United States Rubber Co. plant in Detroit, died Nov. 6.

• **B. H. Pratt,** retired general manager of the old Federal Rubber Co., before he moved to Boston, died at a Milwaukee hotel while on a visit to that city. Before going to Milwaukee, Mr. Pratt was general manager of the Fisk Rubber Co. plant at San Francisco.

• **Nicholas Mohr,** retired master mechanic of the National Enameling & Stamping Co., Milwaukee, died Nov. 7 at a Milwaukee hospital, aged 66 years. He had worked for the company for 45 years.

CONSTRUCTION STEEL

. . . STRUCTURAL STEEL, REINFORCING BARS, PLATES, PILING, ETC.

Fabricated Steel

Lettings of 27,500 tons are double those of a week ago; new projects decline to 12,500 tons from 16,700 tons; plate awards call for 1625 tons.

NORTH ATLANTIC STATES
AWARDS

730 Tons, Bethpage, Long Island, manufacturing plant for Grumman Aircraft Corp., to American Bridge Co., Pittsburgh.

615 Tons, Waterbury, Conn., tool building, to American Bridge Co., Pittsburgh.

336 Tons, South Boston, Mass., casements for U. S. Engineer, to Bethlehem Steel Co., Bethlehem, Pa.

132 Tons, Pennhurst State School, Pa., building addition, to Anthracite Bridge Co., Scranton, Pa., through Henry E. Baton, Inc.

1000 Tons, Tuscaloosa, Ala., State bridge over Warrior River, to Virginia Bridge Co., Roanoke, Va.

268 Tons, Tyner Tenn., oxidation houses for Stone & Webster Engineering Corp., to Bristol Steel & Iron Works, Bristol, Tenn.

CENTRAL STATES

2730 Tons, Chicago, sanitary district of Chicago, Stickney division and sludge building addition, to Bethlehem Steel Co., Bethlehem, Pa.

1750 Tons, Chicago, South Canal Street bascule bridge, to Mount Vernon Bridge Co., Mount Vernon, Ohio.

875 Tons, Michigan, Mackinack County State highway bridge FB-3 OF 49-5-12-C2, to R. C. Mahon Co., Detroit.

375 Tons, Beloit, Wis., engine shop for fairbanks-Morse, to Bethlehem Steel Co., Bethlehem, Pa.

130 Tons, Cleveland, factory extension for Yoder Co., to City Iron Works, Cleveland.

WESTERN STATES

18,000 Tons, Las Vegas, Nev., Basic Magnesium, Inc., plant, to Columbia Steel Co., San Francisco.

550 Tons, Inglewood, Cal., experimental building for North American Aviation, Inc., to Bethlehem Steel Co., Los Angeles.

1078 Tons, Fairview and Washougal, Wash., transmission towers for Aluminum Co. of America, to American Bridge Co., Pittsburgh.

PENDING STRUCTURAL STEEL PROJECTS
NORTH ATLANTIC STATES

2550 Tons, various locations, flanged channel casings and cover for Maritime Commission.

800 Tons, Watertown, Mass., arsenal building.

425 Tons, Jefferson County, N. Y., highway bridge; Mohawk Paving Co., Buffalo, low bidder.

175 Tons, Brooklyn Navy Yard, scrap metal plant.

175 Tons, Lewiston-Auburn, Me., Androscoggin River State bridge.

122 Tons, Brooklyn, building for Tiffany Place Corp.

CENTRAL STATES

4775 Tons, Grand Blanc, Mich., tank plant for Defense Plant Corp.

1700 Tons, Kansas City, Mo., southwest viaduct; only bid, Tobin Construction Co., Kansas City, being 30 per cent over estimate of PWA, project has been abandoned for duration of emergency.

910 Tons, Avon, Ohio, power plant addition, for Cleveland Electric Illuminating Co.

613 Tons, Youngstown, building extension for United Engineering & Foundry Co.

234 Tons, Inkster, Mich., Middlebelt Road State grade separation.

WESTERN STATES

1516 Tons, Hawthorne, Nev., inert storehouses for Navy.

188 Tons, De Beque, Colo., State bridge and underpass.

FABRICATED PLATES
AWARDS

1150 Tons, Coram, Cal., 18 102-in. conduit liners for Shasta Dam (Specification 998), to Pittsburgh-Des Moines Steel Co., Des Moines, Iowa.

475 Tons, Coram, Cal., temporary conduit units for Shasta Dam (Specification 1574-D), to Southwest Welding & Manufacturing Co., Alhambra, Cal.

PENDING PROJECTS

170 Tons, Kodiak, Alaska, gas tanks.

131 Tons, Newark, N. J., plate treater for American Smelting & Refining Co., fabricated metals division.

Pipe Lines

Maverick Production Co., Riverton, Wyo., plans new welded steel pipe line from oil field district to connection with main pipe line system on new Maverick Road, about five miles, for crude oil transmission. Cost close to $50,000. Peter Kiewit Sons Co., Omaha National Bank Building, Omaha, Neb., is low bidder.

Bethlehem Steel Co., Sparrows Point, Baltimore, will begin work soon on new pressure pipe line for water service at local mill, totaling about 23,000 ft. of 48-in. steel, cast iron or reinforced-concrete (alternate bids to be received on different types), to be installed from 3 to 10 ft. underground. Water supply will be used for industrial purpose only. Project will include pumping station and other operating facilities. Cost close to $2,000,000. Whitman, Requardt & Smith, 1304 St. Paul Street, Baltimore, are consulting engineers.

Sinclair Refining Co., 630 Fifth Avenue, New York, plans early construction of new welded steel pipe line from oil refinery at Marcus Hook, Pa., to Pittsburgh, about 400 miles, for gasoline transmission; also a connecting pipe line for similar service from Marcus Hook plant to Baltimore. Installation will include booster pumping stations and other operating facilities with tank terminal at Pittsburgh.

Town Council, Waveland, Miss., has low bid from Gulf Construction Co., Waveland, at $56,990 for pressure pipe line system for natural gas distribution, including main welded steel pipe line for connection with supply source, control station, etc. F. P. Joseph, Glenmora, La., is consulting engineer.

United Refining Co., Warren, Pa., plans extensions in steel pipe line gathering system in Warren Country oil field district, with connecting branch line to main pipe line for crude oil transmission to company oil refinery at Glade Run, near Warren. Cost over $50,000.

United States Engineer Office, Panama City, Fla., has let contract to Aqua Systems, Inc., 385 Gerard Avenue, New York, at $76,360 for pipe line system for gasoline fueling at Tyndall Field, Panama City, with storage and operating facilities.

Phoenix Iron to Build 50,000-Ton Steel Foundry

Phoenixville, Pa.

• • • **Construction of a $500,000** steel foundry by the Phoenix Iron Co., with finances supplied by the Defense Plant Corporation, was announced this week. The plant will have an annual capacity of about 50,000 tons.

Reinforcing Steel

Awards of 6550 tons; 10,975 tons in new projects.

AWARDS
ATLANTIC STATES

100 Tons, Schenectady, N. Y., General Electric Co. hydraulic building, to Albany Steel & Iron Co., Albany, N. Y.

THE SOUTH

107 Tons, Pascagoula, Miss., Ingalls Shipbuilding Co. work, to Truscon Steel Co., Youngstown.

CENTRAL STATES

5000 Tons, Baxter Springs, Kan., ammonia nitrate plant, to Sheffield Steel Corp., Kansas City; McGraw & Freeto, contractors.

1160 Tons, Patterson Field, Ohio, maintenance command building, to Pollak Steel Co., Cincinnati; James I. Barnes Co., contractor.

170 Tons, Rockford, Ill., housing project, to Bethlehem Steel Co., Bethlehem, Pa.; Steenberg Construction Co., contractor.

PENDING REINFORCING BAR PROJECTS
ATLANTIC STATES

500 Tons, Boston, Navy Yard unit; Thomas Connors Co., Boston, contractor.

500 Tons, Paterson, N. J., Wright Aeronautical Corp. manufacturing buildings.

220 Tons, Poughkeepsie, N. Y., factory building.

THE SOUTH

700 Tons, Richmond, Va., Phillip Morris Co. storage building; John T. Wilson Co., contractor.

600 Tons, Bauxite, Ark., Alcoa plant.

250 Tons, Norfolk, Va., Navy Yard, contract No. 4100; Dry Dock Associates, contractors.

CENTRAL STATES

5000 Tons, Merrimac, Wis., Hercules Powder Co. plant; Bechtel, McCone & Parsons, contractors.

2300 Tons, Cleveland, Outhwaite Homes (second unit); bids Dec. 9.

700 Tons, Erie, Mich., viaduct.

200 Tons, East Chicago, Ind., American Steel Foundries, tank parts plant.

Cast Iron Pipe

South Amherst, Ohio, plans pipe lines for water system and other waterworks installation, including 1,000,000-gal. steel tank on 100-ft. steel tower, water-treatment plant and other facilities. Cost about $70,000. Financing is being arranged through Federal aid. Carl J. Simon & Associates, Evans-Central Building, Van Wert, Ohio, are consulting engineers.

Department of Public Works, Watervliet, N. Y., plans pipe line extensions in water system and other waterworks installation. Cost about $150,000. Solomon & Keis, 257 Broadway, Troy, N. Y., are consulting engineers.

Anne Arundel County Sanitary Commission, Glen Burnie, Md., will ask bids soon for extensions in water pipe lines, including about 4500 ft. of 10-in. main line in Light Street Road, Annapolis. Fund of $65,000 has been secured through Federal aid. Walter C. Monroe is chief engineer.

Dawson, Okla., plans 13,400 ft. of 6-in., 3000 ft. of 4-in., and 4700 ft. of 2-in., bell and spigot cast iron pipe for extensions in water system. Cost about $33,000, of which $18,000 will be Federal grant and remainder secured through bond issue. Craig & Wood, Philtower Building, Tulsa, Okla., are consulting engineers.

Hattiesburg, Miss., plans pipe line extensions in water system and other waterworks installation. Cost about $43,000, of which $31,000 will be Federal grant.

Freight Car Plates Put On Strip Mills

Pittsburgh

• • • **Upwards of** 20,000 tons of steel plates for freight car builders, which had been on the books of one large steel maker, have been reallocated and distributed among four or more other steel companies having wide strip mills.

The space on rolling schedules left open by taking this tonnage from one company has been immediately filled by Naval and Maritime plate specifications, the production of which the OPM is expediting as much as possible in order to clear up reported "delinquent" deliveries. The success or failure of this first effort at large scale allocation will determine to what extent additional plates are reallocated and also what methods may be used to put into effect allocations on other strategic steel products.

The reallocation of these plates, it is believed, will present several problems, including additional freight necessary to deliver from the new points of production to points of consumption, the disruption of rolling mill schedules at the plants receiving the car plates, and the further curtailment in the amount of sheets that can be produced for civilian needs.

Meanwhile, the number of direct OPM allocations such as those which have been issued from time to time when material was unavailable through normal channels, has stepped up substantially in the past month. This type of order is not to be confused with the new experiment of large scale allocations now under way. These small allocation orders have interfered seriously in some instances with rolling mill schedules.

Purnell Unable to Serve As OPM Steel Chief

• • • **Frank Purnell,** president, Youngstown Sheet & Tube Co., who last week was offered the post of chief of the iron and steel branch, materials division, OPM, has declined the invitation, THE IRON AGE has learned on good authority.

Weekly Bookings of Construction Steel

Week Ended →	Nov. 25, 1941	Nov. 18, 1941	Oct. 28, 1941	Nov. 26, 1940	Year to Date 1941	Year to Date 1940
Fabricated structural steel awards	27,500	13,950	13,925	25,700	1,215,920	1,059,836
Fabricated plate awards	1,625	9,115	15,015	4,876	136,845	140,475
Sheet steel piling awards	0	0	1,500	200	26,760	65,380
Reinforcing bar awards	6,550	2,825	6,100	12,850	664,655	436,895
Total letting of Construction Steel	35,675	25,890	36,540	43,625	2,044,180	1,702,586

TRADE AUTOMATIC MARK

Manufacturers for Over Thirty Years

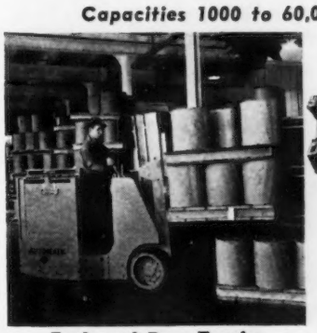
MODERN *Electric Propelled* INDUSTRIAL TRUCKS

FOR ECONOMICAL MATERIALS HANDLING

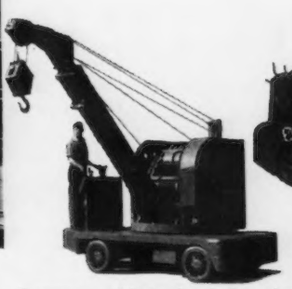
- FORK AND RAM TRUCKS
- LOW AND HIGH LIFT TRUCKS
- COIL AND SHEET HANDLERS
- LOAD CARRIERS
- TRACTORS — CRANES

Capacities 1000 to 60,000 lbs.

Low Lift Skid Platform Type



Fork and Ram Trucks
Telescopic and Non-Telescopic for Pallet and Coil Handling



Cranes — Motorized Slewing Type—*Four Motor Control for Individual and Simultaneous Operation*

High Lift Skid Platform Type

Light Duty Fork Trucks

Die Handlers Heavy Duty Type *with motorized die and unloading platform*

Coil and Sheet Handlers

REQUEST DETAILS AND LITERATURE

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AUTOMATIC TRANSPORTATION CO.

75 W. 87th St. Div. of the Yale & Towne Mfg. Co. CHICAGO, ILL.

MACHINE TOOLS

. . . SALES, INQUIRIES AND MARKET NEWS

Big Incendiary Bomb Order Calls for Equipment

Cleveland

• • • **The outstanding event** in machine tool market was the Chemical Warfare Department's placement of orders for 4-lb. incendiary bombs in Pittsburgh, Cleveland and Chicago. Since this is a die cast bomb it will require screw machines and drilling machines in its manufacture. While most of the prime contractors who received such orders have most of the necessary equipment already in their plants, it is expected that a moderate amount of new business will be forthcoming from this source, as well as from probable sub-contractors. It is reported that about 25,000,000 of these bombs are to be produced.

Other activity in the market was largely concentrated in clearing up the remainder of large business closed in recent weeks, checking on specifications, and rearranging delivery dates on more vital orders.

The industry mourned the loss of Clifford S. Stilwell, executive vice-president of Warner & Swasey Co., one of its most capable executives (see p. 88 for details). With the machine tool industry more hard pressed with defense work than almost all other industries in the country, the loss of one of its leaders is most greatly felt at the present time.

•

Night Shifts Still Light

Cincinnati

• • • **Except for the continuous flow** of orders, the district machine tool market has no new feature. Additional business placed during the past week ran the whole gamut of machine tools from small grinders through to large planers and boring mills. Delivery dates, of course, are protracted well into next year, thus keeping the major problem still one of production. Further plant expansions have been suggested by Washington officials, and these suggestions are under consideration. While third and night shifts are the rule, not all plants are so operating. In some instances, the night shift is virtually a skeleton and without much influence in increasing plant operation. Government officials continue to press the trade for broadening of activity and the 24-hour operation of shop equipment is constantly being requested.

•

OPA Schedules 3rd Session On Machine Tool Prices

• • • **Further discussion** of a schedule of maximum prices for new machine tools will take place at a third meeting early in December between representatives of the industry and the Office of Price Administration, Leon Henderson, Administrator, announced last week.

The initial meeting with machine tool makers was held Oct. 22 after Mr. Henderson had announced that consideration was being given to the issuance of a formal ceiling price schedule. A second meeting took place Nov. 19 at which technical information as to trade methods and practices was obtained.

Detroit Engineers Move

Detroit

• • • **The Engineering Society** of Detroit and the Detroit office of the Engineering Societies Personnel Service, Inc., will move their offices Dec. 1, from present quarters in Hotel Statler to permanent quarters in the new engineering society building, the Horace H. Rackham Educational Memorial, 100 Farnsworth Ave.

the practical side of Springmaking—BY DUNBAR

Investigate SPRING finishes

One feature of spring design always present is the question of finish. Springs may be made of Pre-finished materials or a finish applied after forming and heat treating.

The following pre-finished materials are available

- Music Wire: Bright, Cadmium Plated, Tinned
- Hand Drawn Spring Wire and Basic or Bessemer Wire: Bright, Tinned, Coppered, Galvanized, Cadmium Plated
- Oil Tempered Wire . . . Black
- Stainless Steel . . . Natural
- Brass . . . Natural
- Phosphor Bronze . . . Natural

For rust resistant finishes we suggest the following for round or flat materials

- Enamel or Japan: Black, Red, Brown, Gray (These are the most commonly used)
- Lacquer
- Nickel: over Copper and Buffed, Buffed, Burnished, Dull, Black
- Cadmium . . . Bright
- Galvanized . . . Chrome Plated Dull
- Brass Plated . . . Black Oxidized
- Copper Plated . . . Statuary Bronze

Bring your questions about finishes to Dunbar for advice and consultation.

Dunbar Bros. Co.

DIVISION OF ASSOCIATED SPRING CORPORATION

BRISTOL, CONNECTICUT

"Quality Springs since 1845"

NON-FERROUS METALS

. . . MARKET ACTIVITIES AND PRICE TRENDS

DPC To Build Two Aluminum Plants

• • • **An aluminum fabricating** plant, to cost $22,000,000, has been authorized by Federal Loan Administrator, Jesse Jones, for construction by DPC at Fairview, Ore., to be operated by the Aluminum Co. of America. At the same time, it was announced that a 128,000,000 lb. aluminum plant, costing $33,000,000, will be constructed at Lake Catherine, near Malvern, Ark., which will also be operated by ALCOA. The Oregon fabricating plant, to be built by the United Engineering & Foundry Co., Pittsburgh, will have a capacity of 30,000 tons of fabricated aluminum. RFC, during the past week, approved another loan to the Permanente Corp., to enlarge its magnesium production capacity.

While there has been no official confirmation, it is believed that MRC has agreed to pay 12c. a lb. for additional quantities of Latin-American copper. November copper sales have been completed, mainly through excellent cooperation between producers and consumers. This month, after consumers learned that allocations were complete, but before they received official notification, they obtained their certificate numbers, tonnages allocated, and whether their allocations were for foreign or domestic copper, and passed the word along to producers. Producers, informed of this, quickly set up to handle the shipments in record time.

Singapore tin prices during the latter part of the past week were again below the 52c. a lb. ceiling allowed by domestic agents, but so slightly that only a few importers can operate in the Straits markets. However, considerable quantities have been reported for January arrival in New York at the ceiling price.

The 15 per cent lead pool netted about 6300 tons of this metal during November. There is some concern in the industry, however, over the fact that no Australian lead will be delivered to United States during December. Quantities in the neighborhood of 5500 tons a month have been forthcoming from Australia for the past several months, and the complete curtailment of shipments from this source may work a hardship on domestic consumers.

Lead refinery operations during October were sharply off, with production for the month totaling 41,127 tons, compared with 44,903 tons in September and 56,600 tons in October, 1940. Shipments likewise were down to 43,537 tons, against 47,093 tons in September, while stocks roes from 13,148 tons in September to 19,735 tons in October.

Non-Ferrous Prices

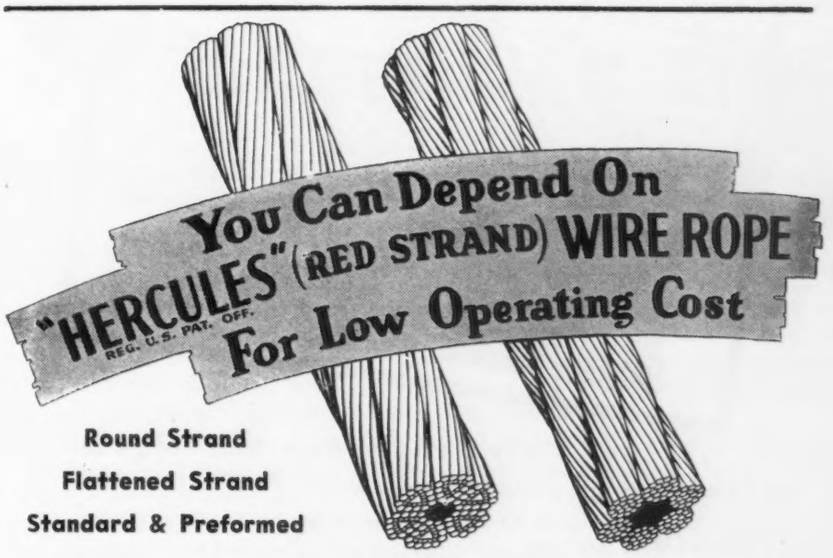
(Cents per lb. for early delivery)

Copper, Electrolytic[1]	12.00
Copper, Lake	12.00
Tin, Straits, New York	52.00
Zinc, East St. Louis[2]	8.25
Lead, St. Louis[3]	5.70

[1] Mine producers' quotations only, delivered Conn. Valley. Deduct ¼c. for approximate New York delivery price. [2] Add 0.39c. for New York delivery. [3] Add 0.15c. for New York delivery.

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 15c.-17c. a lb.; No. 12 remelt No. 2, standard, 16c. a lb. NICKEL electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 16.50c. a lb., New York: American, 13c. a lb., f.o.b. smelter. QUICKSILVER, $195 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 13.25c. a lb.



Round Strand
Flattened Strand
Standard & Preformed

WHY not let "HERCULES" (Red-Strand) Wire Rope help you meet present day production requirements and still maintain a reasonable margin of profit? You will quickly discover that "HERCULES" is a dependable ally—not only in today's fight against increasing operating costs—but also in your endeavor to speed up production.

Made Only By **A. LESCHEN & SONS ROPE CO.** *Established 1857*
5909 Kennerly Avenue, St. Louis, Mo.
New York • Chicago • Denver • San Francisco • Seattle • Portland

SCRAP

. . . MARKET ACTIVITIES AND PRICE TRENDS

Compliance Drive On; Coast Prices Raised

• • • **Heading into** a crucial period when iron and steel scrap supplies temporarily will be more limited than ever, the Government is pounding harder to force compliance with its regulations and is mapping further steps to restrict the use of scrap, which is not plentiful in relation to the high rate of consumption. As expected, West Coast ceilings have been re-jiggered, with maximum basing point prices at San Francisco and Los Angeles increased by $2.50 per gross ton for open hearth grades.

At Chicago one large steel producer plans to remove three or four open hearths Dec. 1 through lack of scrap. Cleveland reports a drop in operations is expected. At Buffalo the necessity for allocations is becoming more apparent. The Birmingham district without more scrap cannot regain the high operations that once prevailed.

Many orders have been issued during the past two weeks directing scrap shipments to assist defense producers, but the allocation plan is still very much in its initial stages. The new reports which have been filed with the Bureau of Mines by producers, dealers and consumers will enable the Government to commandeer fixed percentages based on the reports filed for the preceding month. In addition to this basis for diversions, the Government will have available cross checks for its guidance.

Dealers were warned last week by OPM to comply more quickly with allocation orders. OPM also criticized the creation of "No. 1 industrial heavy melting scrap," by some market interests. Another development was the announcement by Youngstown Sheet & Tube Co. that OPA had advised it no commission is chargeable by the seller on scrap shipped from seller's own yard. The commission has been 50 cents. Three more large broker-dealers were revealed to have signed stipulations providing for the refund of amounts collected in excess of the established maximum prices.

On the West Coast, where an unsatisfactory price situation has existed and where pig iron capacity is meager while a sharp expansion of steel capacity is projected, price ceiling adjustments were made this week. A higher price is allowed on steel making grades. The OPA action takes the form of an amendment to Price Schedule No. 4, which also contains revisions with respect to low phosphorus scrap and machine shop turnings. Leon Henderson asserted the West Coast price

BOUT of the O'TOOLS
10 ROUNDS—
AIR VS. HIGH-CYCLE
GRINDERS
HIGH-CYCLE WINS ROUND 1
SET-UP:
At Pressed & Welded Steel Products Co., Long Island City, N.Y. Needed four more portable tools — grinders and sanders. Short of air supply. Should it be AIR or HIGH-CYCLE? The Rotor Analyst recommended HIGH-CYCLE. The results:
SCORE:
HIGH-CYCLE defeats AIR in this plant with these three telling blows!
1 Gives 25% FASTER production. On this job, higher speed under load with HIGH-CYCLE produces 25% to 30% more work per hour than with AIR tools.
2 Saves $1695 in first cost. Air compressor would have cost $2632. Frequency converter for HIGH-CYCLE cost only $937.
3 Cuts power bill $725 per year. Saves 48.5 B.H.P. or 36.2 K.W. At 1c per K.W.H., that's $725 per 250-day year on full load basis.
WHAT WOULD BE THE SCORE IN YOUR PLANT?
Why not let the Rotor Analyst stage and referee the bout of AIR and HIGH-CYCLE in your "ring"—to find out definitely which type of tool can turn out most work under your set-up and give you greatest savings. No obligation.
The Rotor Analyst has 65 different AIR tools and 59 different HIGH-CYCLE tools with which to solve your problems.
THE ROTOR TOOL CO.
CLEVELAND, OHIO
AIR
HIGH CYCLE
UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS

changes must not be construed as indicating possible price changes in other areas.

The official summary of the adjustments announced Tuesday is as follows:

1. Maximum basing point prices at San Francisco and Los Angeles are increased by $2.50 per gross ton with respect to grades of scrap usually used in open-hearth furnaces.

2. A shipping point price of $12 a gross ton for No. 2 heavy melting steel scrap may be paid in California wherever the present maximum is below that figure. Existing grade differentials applying to San Francisco and Los Angeles basing points scale upward and downward from this level with respect to all other grades either for open hearths or foundries.

This enables steel mills and foundries within the state to pay at least $12 a gross ton at the point of origin and to absorb all actual transportation charges incident to shipment to the consuming plant.

3. On steel making grades only, Oregon is added to the nine other states defined as "remote scrap areas." This allows steel mills and foundries to pay a maximum shipping point price of at least $12 a gross ton for No. 2 heavy melting in Oregon and to absorb up to a total of $5 a ton in transportation costs. Oregon is not established as a "remote state" for foundry grades.

The amendment re-defines the San Francisco basing point to include South San Francisco, Oakland and Niles. Pittsburg, Cal., is established as a new basing point with the same prices as San Francisco for all grades. Because little scrap of "steel making" grades is consumed in Oregon, Portland is eliminated as a basing point for those grades. However, it is continued as a basing point for foundry grades.

Another adjustment made by the amendment is an increase of $1.50 per gross ton in the basing point prices of No. 1 cupola cast at both San Francisco and Los Angeles and the differentials established in St. Louis for other cast iron grades are now applicable to San Francisco and Los Angeles.

Two other minor revisions are included in the new amendment. One increases by $1 per gross ton the basing point price of low phosphorus scrap at Cincinnati and Portsmouth, Ohio, and Ashland, Ky. The other removes certain general restrictions on delivered prices in cases where OPM allocates machine shop turnings to ferro-alloy plants. This clears the way for these plants, which are remote from the sources of machine shop turnings, to secure supplies needed for a continuance of their products.

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CHICAGO—One of the largest mills here will close three or four open hearths Dec. 1 and reduce total steel operations about 10 per cent due to lack of scrap. One of this mill's biggest industrial suppliers has been totally cut off by allocations. Other sources have vanished or diminished for the same reason. The general situation has reached the point where it is possible other mills may follow suit either about the same time or closely following.

•

CLEVELAND—With additional furnaces being taken off week after week, due to scrap shortages, steel executives are predicting operations will fall to the vicinity of 85 per cent within the next 60 days. As a whole, there are no important changes in the rate of flow of scrap.

•

PITTSBURGH—Little or no change in the scrap situation here is discernible. Some units remain on the ragged edge where any hold-up of railroad shipments would spell curtailment in steel output. Overgrading of primary scrap supplies continues.

•

DETROIT—Recent strictness in the elimination of the 50c. per ton commission in cases where the agent handling the scrap has prepared it in his own yard, has precipitated a great deal of discussion. Some yard operators have dealt with the local mill and will now have to do so without collecting commission.

•

BUFFALO—The necessity for allocations daily is becoming more apparent. No scrap arrived here by water during the past week and stockpiles at the area's largest steel plant again are low.

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CINCINNATI—Another meeting with OPA has been called for this week, the announcement indicating that the cast iron situation would be discussed. Steel scrap, while still not plentiful, tends to flow a little better, but foundry scrap continues scarce.

•

BIRMINGHAM—Although there has been no announcement to that effect, it is considered doubtful here that steel production in the Birmingham district again will reach the level where 23 out of 26 open-hearth furnaces are operating until more adequate scrap supplies are available.

ONE OPERATION That Can Save You HOURS OF PRODUCTION TIME

The simple procedure of moving a Profilometer tracer over the machined surfaces of your parts, and noting the "Profilometer Reading" on the instrument dial, can be your means to save time, trouble and expense.

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Profilometers are a practical aid in speeding up production because they are used ***in the production departments.*** They are sturdy, self-contained instruments designed and built for use in the shop. Because they provide direct dial readings in true inch units—with no computations or scaling methods required—almost all machine operators can use them. Measurements can be made on surfaces of practically any size, shape or degree of roughness.

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343 SOUTH MAIN ST. • ANN ARBOR, MICH.

Iron and Steel Scrap (other than railroad scrap)

(Maximum basing point prices as revised by OPA to Sept. 26, 1941, from which shipping point prices and consumers' delivered prices are to be computed, per gross ton)

Basing Points → / ▼ GRADES	Pittsburgh	Johnstown, Weirton, Steubenville, Youngstown, Warren, Sharon, Canton	Chicago*	Kokomo	Bethlehem	Claymont, Coatesville, Phoenixville, Harrisburg	Sparrows Point	Buffalo	Cleveland	Toledo	Cincinnati*, Portsmouth, Middletown, Ashland	St. Louis	Detroit	Duluth, Minneapolis**	Birmingham	Chattanooga	Radford, Va	Worcester, Bridgeport, Phillipsdale, R. I.	Los Angeles, San Francisco, Seattle, Portland	Minnequa, Colo.
No. 1 heavy melting	$20.00	$20.00	$18.75	$18.25	$18.25	$18.75	$18.75	$19.25	$19.50	.....	$19.50	$17.50	$17.85	$18.00	$17.00	.....	.....	.....	$14.50	$16.50
No. 1 hyd. comp. black sheet	20.00	20.00	18.75	18.25	18.25	18.75	18.75	19.25	19.50	.....	19.50	17.50	17.85	18.00	17.00	.....	.....	.....	14.50	16.50
No. 2 heavy melting	19.00	19.00	17.75	17.25	17.25	17.75	17.75	18.25	18.50	.....	18.50	16.50	16.85	17.00	16.00	.....	.....	(See	13.50	15.50
Dealers' No. 1 bundles	19.00	19.00	17.75	17.25	17.25	17.75	17.75	18.25	18.50	.....	18.50	16.50	16.85	17.00	16.00	.....	.....	foot-	13.50	15.50
Dealers' No. 2 bundles	18.00	18.00	16.75	16.25	16.25	16.75	16.75	17.25	17.50	.....	17.50	15.50	15.85	16.00	15.00	.....	.....	notes)	12.50	14.50
Mixed borings and turnings	15.25	15.25	14.00	14.25	13.50	14.00	14.00	14.50	14.75	13.10	14.75	12.75	13.10	.....	12.25	.....	.....	.....	9.75	11.75
Machine shop turnings	15.50	15.50	14.25	14.50	13.75	14.25	14.25	14.75	15.00	13.35	15.00	13.00	13.35	15.50	15.00	(Alloy, W.Va. 17.60)	.....	.....	10.00	12.00
Shoveling turnings	16.50	16.50	15.25	15.50	14.75	15.25	15.25	15.75	16.00	14.35	16.00	14.00	14.35	16.50	.....	.....	.....	.....	11.00	13.00
No. 1 busheling	19.50	19.50	18.25	17.75	17.75	18.25	18.25	18.75	19.00	.....	19.00	17.00	17.35	17.50	16.00	.....	.....	.....	14.00	16.00
No. 2 busheling	15.50	15.50	14.25	13.75	13.75	14.25	14.25	14.75	15.00	.....	15.00	13.00	13.35	13.50	12.50	.....	.....	.....	10.00	12.00
Cast iron borings	15.75	15.75	14.50	14.00	14.00	14.50	14.50	15.00	15.25	13.60	[6]15.25	13.25	13.60	13.75	12.75	.....	.....	.....	10.25	12.25
Uncut structural, plate scrap	19.00	19.00	17.75	17.25	17.25	17.75	17.75	18.25	18.50	.....	18.50	18.50	16.85	17.00	16.00	.....	.....	.....	13.50	15.50
No. 1 cupola	21.00	21.00	20.00	20.00	22.50	23.00	22.00	20.00	22.00	.....	21.00	20.00	20.35	*19.00	20.00	20.50	21.00	22.00	18.00	.....
Heavy breakable cast	19.50	19.50	18.50	18.50	21.00	21.50	21.00	18.50	20.50	.....	19.50	18.50	18.85	*17.50	18.50	.....	.....	20.50	17.00	.....
Stove plate	19.00	[5]19.00	17.00	16.00	18.00	18.50	18.00	19.00	18.00	15.60	17.50	17.00	14.10	*16.00	17.00	17.50	18.00	17.50	14.00	.....
Low phos. billet, bloom crops	25.00	25.00	23.75	23.75	23.25	23.75	23.75	24.25	24.50	.....	23.50	22.50	22.85	23.00	22.00	.....	.....	.....	19.50	.....
Low phos. bar crops, smaller	23.00	23.00	21.75	21.75	21.25	21.75	21.75	22.25	22.50	.....	21.50	20.50	20.85	21.00	20.00	.....	.....	.....	19.50	.....
Low phos. pu'ch'gs, plate scrap[1]	24.75	23.00	21.75	21.75	21.25	21.75	21.75	22.25	22.50	.....	21.50	20.50	20.85	21.00	20.00	.....	.....	.....	17.50	.....
Machinery cast, cupola size[2]	22.00	22.00	21.00	21.00	23.50	24.00	23.50	21.00	23.00	.....	22.00	21.00	21.35	*20.00	21.00	21.50	22.00	23.00	19.00	.....
No. 1 mach. cast, drop-broken, 150 lb. and under	22.50	22.50	21.50	21.50	24.00	24.50	24.00	21.50	23.50	.....	22.50	21.50	21.85	20.50	21.50	22.00	22.50	23.50	19.50	.....
Clean auto cast	22.50	22.50	21.50	21.50	24.00	24.50	24.00	21.50	23.50	.....	22.50	21.50	21.85	20.50	21.50	22.00	22.50	23.50	19.50	.....
Punchings and plate scrap[3]	23.75	22.00	20.75	20.75	20.25	20.75	20.75	21.25	21.50	.....	20.50	19.50	19.85	20.00	19.00	.....	.....	.....	16.50	.....
Punchings and plate scrap[4]	22.75	21.00	19.75	19.75	19.25	19.75	19.75	20.25	20.50	.....	19.50	18.50	18.85	19.00	18.00	.....	.....	.....	15.50	.....
Heavy axle, forge turnings	21.25	19.50	18.25	18.25	17.75	18.25	18.25	18.75	19.00	.....	18.00	17.00	17.35	17.50	16.50	.....	.....	.....	14.00	.....
Medium h'vy el f'ce turnings	19.75	18.00	16.75	16.75	16.25	16.75	16.75	17.25	17.50	.....	16.50	15.50	15.85	16.00	15.00	.....	.....	.....	12.50	.....

[1] This grade is ⅜-in. and heavier, cut 12 in. and under. [2] May include clean agricultural cast. [3] Under ⅜ to ¼-in., cut 12 in. and under. [4] Under ¼-in. to No. 12 gage, cut 12 in. and under. [5] Youngstown, Warren, Sharon and Canton are not basing points on this grade. [6] Middletown and Cincinnati price for this grade is $15. * Includes Newport, Ky. Shipping point price within Cincinnati basing point may be 80c. a ton below basing point price listed above for all grades except the six cast grades. ** Minneapolis and St. Paul are basing points on following grades only: No. 1 cupola, heavy breakable cast, stove plate, machinery cast cupola size, No. 1 machinery cast drop broken, clean auto cast.

Railroad Scrap *(Per gross ton, delivered consumers' plants located on line of railroad originating scrap)*

Basing Points → / ▼ GRADES	Pittsburgh, Sharon, Pa., Wheeling, Steubenville, Youngstown, Canton	Chicago	Kokomo	Philadelphia	Wilmington	Sparrows Point	Cleveland	Buffalo	Portsmouth, Middletown, Ashland	St. Louis	Kansas City	Cincinnati	Detroit	Duluth	Birmingham	Los Angeles, San Francisco, Seattle
No. 1 heavy melting	$21.00	$19.75	$19.25	$19.75	$19.75	$19.75	$20.50	$20.25	$20.50	$18.50	$17.00	$20.50	$18.85	$19.00	$18.00	$15.50
Scrap rails	22.00	20.75	20.25	20.75	20.75	20.75	21.50	21.25	21.50	19.50	18.00	21.50	19.85	20.00	19.00	16.50
Rerolling rails	23.50	22.25	21.75	22.25	22.25	22.25	23.00	22.75	23.00	21.00	19.50	23.00	21.35	21.50	20.50	18.00
Scrap rails 3 ft. and under	24.00	22.75	22.25	22.75	22.75	22.75	23.50	23.25	23.50	21.50	20.00	23.50	21.85	22.00	21.00	18.50
Scrap rails 2 ft. and under	24.25	23.00	22.50	23.00	23.00	23.00	23.75	23.50	23.75	21.75	20.25	27.75	22.10	22.25	21.25	18.75
Scrap rails 18 in. and under	24.50	23.25	22.75	23.25	23.25	23.25	24.00	23.75	24.00	22.00	20.50	24.00	22.35	22.50	21.50	19.00

Railroads not operating in a basing point may sell rerolling rails f.o.b. their lines at average price of their sales from Sept. 1, 1940, to Jan. 31, 1941. Rerolling mills may absorb all transportation charges necessary to obtain such rails. Maximum prices for scrap rails and rerolling rails from mines, logging camps and similar sources need not be sold for less than $13.50 a gross ton for scrap rails and $15 for rerolling material at shipping point.

Where the railroad originator of the scrap operates in two or more of the basing points named, the highest of the maximum prices established for such basing points shall be the maximum price of the scrap delivered to a consumer's plant at any point on the railroad's line, except that switching charges of 84c. per gross ton shall be subtracted from the maximum prices of scrap originating from railroads operating in Chicago and sold for consumption outside Chicago.

Explanatory Notes

(A basing point includes its switching district)

MAXIMUM PRICE at which any grade of scrap may be delivered to consumer's plant, wherever located, is the shipping point price, plus actual transportation from the shipping point to consumer. Where shipment is by water, actual handling charges at the dock of not more than 75c. a gross ton may be included as part of transportation charges. In no case may this maximum price exceed by more than $1 prices (for material other than railroad scrap) for the basing point nearest the consumer.

COMPUTING SHIPPING POINT PRICE: A shipping point is the point from which the scrap is to be shipped to a consumer. A shipping point price is computed as follows: (a) For Shipping Points located within a basing point.—The price established for the basing point in which the shipping point is located, is determined. Then deduct from this the actual costs involved in transporting scrap from the shipping point to the consumer's plant within the basing point which is nearest, in terms of transportation costs, to the shipping point; (b) For shipping points located outside a basing point.—The price established for the nearest basing point, in terms of transportation charges, to the shipping point is determined. Deduct from this the lowest established charge for transporting scrap from the shipping point to such basing point. *Exceptions:* (1) The shipping point price at any shipping point in New England, of those grades of scrap for which no prices are listed above shall be the Johnstown basing point price, minus the all-rail transportation costs from the New England shipping point to Johnstown; (2) Shipping point prices for New York City, Brooklyn, New York, and New Jersey shall be computed from the Bethtlehem, Pa., basing point.

GULF PORT PRICES: Scrap shipped from Tampa, Pensacola, Gulfport, Mobile, New Orleans, Lake Charles, Port Arthur, Beaumont, Galveston, Texas City, Houston and Corpus Christi, has a maximum shipping point price not exceeding $14 a gross ton, f.o.b. cars, for No. 1 heavy melting steel. For other grades, the differentials established for Birmingham apply.

REMOTE SCRAP: Defined as all grades of scrap listed in table above (exclusive of railroad scrap) located in Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas and Oklahoma. Maximum shipping point price of remote scrap is $12 a gross ton, for No. 2 heavy melting steel, with differentials for other grades the same as differentials established in table above for St. Louis. The maximum delivered price of remote scrap is the shipping point price, plus actual transportation charges, except that when necessary to absorb transportation charges, the maximum delivered price may be exceeded by a maximum of $4 a ton. Thus the maximum delivered price for remote scrap may exceed the price for the nearest basing point by $5. In the event that an allowance in excess of $5 a ton is necessary to acquire a tonnage of remote scrap, a consumer may apply to OPA for permission to exceed the $5 allowance. Purchases under these remote scrap provisions must be for not less than one car a month and must be reported in detail. Provisions of this remote scrap section expire Dec. 31, 1941.

BROKER COMMISSIONS: A commission of up to 50c. a ton above the maximum prices is allowed to brokers.

*OPA maximum for sale by dealer. **Nominal.

UNPREPARED SCRAP: Regardless of source, maximum price of unprepared scrap is $2.50 less than maximum for corresponding grade of prepared scrap.

BILLET AND BLOOM CROPS: Where such material originates in the Pittsburgh basing point, it may be sold delivered to a consumer within or without the Pittsburgh point at the price given in Schedule 'A, plus not more than $2.50 in transportation charges. Lowest established transportation charges will govern.

Non-Ferrous Scrap

(Dealers buying prices, cents per lb.)

	New York	Philadelphia	Pittsburgh	Cleveland	Detroit	Chicago
No. 1 hvy. copper	*10.00	*10.00	*10.00	*10.00	*10.00	*10.00
Light copper	* 8.00	* 8.00	* 8.00	* 8.00	* 8.00	* 8.00
Hvy. yel. brass	6.25-6.50	**6.25	7.50-8.00	5.75-6.25	7.00-7.25	7.50
Light brass	5.25-5.50	**5.50	7.00-7.25	6.00-6.50	6.50-6.75	7.00 7.25
No. 1 Comp. turn.	8.75-9.00	**7.75	**9.00-9.25	8.50-9.00	9.00-9.25	9.00-9.25
New brass clips	8.00-8.25	8.50-9.00	7.75-8.00	8.00-8.50	7.50-8.00	7.75-8.25
Soft lead	5.25-5.50	5.00-5.25	4.75-5.00	4.75-5.00	5.00-5.25	4.75-5.00
Old zinc	4.00-4.25	4.25	4.25-4.50	4.00-4.50	4.25-4.50	4.50-5.00
Cast, forged alum.	*11.00	*11.00	*11.00	*11.00	*11.00	*11.00
Old sheet alum.	*11.00	*11.00	*11.00	*11.00	*11.00	*11.00
Solder joints	8.75-9.00	9.00	7.50-8.00	6.50-6.75	5.50-6.00	7.50-8.00
No. 1 pewter	35.00-36.00	35.00-36.00	31.00-32.00	32.50-34.00	37.50-38.50	32.80-34.00

* OPA maximum for sale by dealer. ** Nominal.

. . . Comparison of Prices

(Advances Over Past Week in **Heavy Type**; Declines in *Italics*)

(Prices Are F.O.B. Major Basing Points)

	Nov. 25, 1941	Nov. 18, 1941	Oct. 28, 1941	Nov. 26, 1940
Flat Rolled Steel:				
(Cents Per Lb.)				
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Stain's c. r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate:				
(Dollars Per Base Box)				
Tin plate	$5.00	$5.00	$5.00	$5.00
Manufacturing ternes	4.30	4.30	4.30	4.30
Bars and Shapes:				
(Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wire and Wire Products:				
(Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails:				
(Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel:				
(Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp:				
(Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

	Nov. 25, 1941	Nov. 18, 1941	Oct. 28, 1941	Nov. 26, 1940
Pig Iron:				
(Per Gross Ton)				
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.84	$24.84
No. 2, Valley furnace	24.00	24.00	24.00	23.00
No. 2, Southern Cin'ti	24.06	24.06	24.06	23.06
No. 2, Birmingham	20.38	20.38	20.38	19.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	23.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	24.34
Basic, Valley furnace	23.50	23.50	23.50	22.50
Malleable, Chicago†	24.00	24.00	24.00	23.00
Malleable, Valley	24.00	24.00	24.00	23.00
L. S. charcoal, Chicago	31.34	31.34	31.34	30.34
Ferromanganese‡	120.00	120.00	120.00	120.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton. ‡For carlots at seaboard.

Scrap:				
(Per Gross Ton)				
Heavy melt'g steel, Pgh.	$20.00	$20.00	$20.00	$22.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	20.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	20.25
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	18.00
Low phos. plate, Youngs'n	23.00	23.00	23.00	24.00
No. 1 cast, Pittsburgh	22.00	22.00	22.00	22.25
No. 1 cast, Philadelphia	24.00	24.00	24.00	23.25
No. 1 cast, Chicago*	21.00	21.00	21.00	18.00

*Changed to gross ton basis, April 3, 1941.

Coke, Connellsville:				
(Per Net Ton at Oven)				
Furnace coke, prompt	$6.125	$6.125	$6.125	$5.25
Foundry coke, prompt	6.875	6.875	6.875	5.75
Non-Ferrous Metals:				
(Cents per Lb. to Large Buyers)				
Copper, electro., Conn.*	12.00	12.00	12.00	12.00
Copper, Lake, New York	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	50.375
Zinc, East St. Louis	8.25	8.25	8.25	7.25
Lead, St. Louis	5.70	5.70	5.70	5.65
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

*Mine producers only.

The various basing points for finished and semi-finished steel are listed in detailed price tables, pages 110-116.

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

. . . Composite Prices

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Nov. 25, 1941	2.30467c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.30467c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.30467c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.30467c. a Lb.	$22.61 a Gross Ton	$21.00 a Gross Ton

	FINISHED STEEL High	FINISHED STEEL Low	PIG IRON High	PIG IRON Low	SCRAP STEEL High	SCRAP STEEL Low
1941	2.30467c.,	2.30467c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.92, Nov. 10
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99629c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

A weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip. These products represent 78 per cent of the United States output. This revised index recapitulated to 1929 in the Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Prices of Finished Iron and Steel...

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases freight absorbed to meet competition.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold rolled[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long ternes[2]	3.80¢		3.80¢									4.55¢			
STRIP															
Hot rolled[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold rolled[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢	3.16¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R	2.95¢			2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢	3.31¢	
TIN PLATE															
Standard cokes, base box	$5.00	$5.00	$5.00						$5.10						$5.32
BLACK PLATE															
29 gage[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ (10)			3.37¢
TERNES M'FG.															
Special coated, base box	$4.30	$4.30	$4.30						$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (billet)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢	2.39¢	
Reinforcing (rail)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	2.55¢	2.25¢		2.47¢
Cold finished[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit = 2.70¢)					3.01¢	2.97¢
Alloy, hot rolled	2.70¢	2.70¢				2.70¢		(Bethlehem, Massillon, Canton = 2.70¢					2.80¢		
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
								(Coatesville and Claymont = 2.10¢)							
PLATES															
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	2.25¢(11)		2.45¢	2.65¢	2.25¢	2.29¢	2.15¢
Wrought iron	3.80¢														
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	3.67¢
Alloy	3.50¢	3.50¢			(Coatesville = 3.50¢)						3.95¢	4.15¢		3.70¢	3.37¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem = 2.10¢)			2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
WIRE[9]															
Bright	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)					3.10¢			2.92¢
Galvanized	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)					3.10¢			2.92¢
Spring	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)					3.80¢			3.52¢
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢
IRON BARS															
Common		2.25¢			(Terre Haute, Ind. = 2.15¢)										
Wrought single refined	4.40¢														
Wrought double refined	5.40¢														

[1] Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. [2] Unassorted 8-lb. coating. [3] Widths up to 12 in. [4] Carbon 0.25 per cent and less. [5] Applies to certain width and length limitations. [6] For merchant trade. [7] Straight lengths as quoted by distributers. [8] Also shafting. For quantities of 20,000 to 39,999 lb. [9] Carload lot to manufacturing trade. [10] Boxed. [11] Ship plates only.

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2 higher; f.o.b. Duluth, billets only, $2 higher.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

Shell Steel

Basic open hearth shell steel, f.o.b. Pittsburgh and Chicago.

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting to length, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)	*Per Lb.*
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

Alloy Steel Blooms, Billets and Slabs

	Per Gross Ton
Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem	$54.00

TOOL STEEL

(F.o.b. Pittsburgh)

	Base per Lb.
High speed	67c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices are delivered quotations per gross ton computed on the basis of the official maxima.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorous	Charcoal
Boston	$25.50	$25.00	$26.50	$26.00	.....	.....
Brooklyn	27.50	.....	.....	28.00	.....	.....
Jersey City	26.53	26.03	27.53	27.03	.....	.....
Philadelphia	25.84	25.34	26.84	26.34	.....	.....
Bethlehem, Pa.	**$25.00**	**$24.50**	**$26.00**	**$25.50**	.....	.....
Everett, Mass.	**25.00**	**24.50**	**26.00**	**25.50**	.....	.....
Swedeland, Pa.	**25.00**	**24.50**	**26.00**	**25.50**	.....	.....
Steelton, Pa.	.....	**24.50**	.....	.....	**$29.50**	.....
Birdsboro, Pa.	**25.00**	**24.50**	**26.00**	**25.50**	**29.50**	.....
Sparrows Point, Md.	**25.00**	**24.50**	.....	.....	.....	.....
Erie, Pa.	**24.00**	**23.50**	**25.00**	**24.50**	.....	.....
Neville Island, Pa.	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....
Sharpsville, Pa.*	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....
Buffalo	**24.00**	**23.00**	**25.00**	**24.50**	**29.50**	.....
Cincinnati	24.44	24.61	.....	25.11	.....	.....
Canton, Ohio	25.39	24.89	25.89	25.39	.....	.....
Mansfield, Ohio	25.94	25.44	26.44	25.94	.....	.....
St. Louis	24.50	24.02	.....	.....	.....	.....
Chicago	**24.00**	**23.50**	**24.50**	**24.00**	.....	....$31.34
Granite City, Ill.	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....
Cleveland	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....
Hamilton, Ohio	**24.00**	**23.50**	.....	**24.00**	.....	.....
Toledo	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....
Youngstown*	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....
Detroit	**24.00**	**23.50**	**24.50**	**24.00**	.....	.....
Lake Superior fc.	.....	.....	.....	.....	.....	**$28.00**
Lyles, Tenn. fc.†	.....	.....	.....	.....	.....	**33.00**
St. Paul	26.63	.....	27.13	26.63	.....	.....
Duluth	**24.50**	.....	**25.00**	**24.50**	.....	.....
Birmingham	**20.38**	**19.00**	**25.00**	.....	.....	.....
Los Angeles	27.50	.....	.....	.....	.....	.....
San Francisco	27.50	.....	.....	.....	.....	.....
Seattle	27.50	.....	.....	.....	.....	.....
Provo, Utah	**22.00**	.....	.....	.....	.....	.....
Montreal	27.50	27.50	.....	28.00	.....	.....
Toronto	25.50	25.50	.....	26.00	.....	.....

GRAY FORGE IRON

Valley or Pittsburgh furnace **$23.50**

*Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of basic grade (1.75 per cent to 2.25 per cent).

Phosphorous Differential: Basing point prices are subject to a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over.

†Price shown is for low-phosphorous iron; high-phosphorous sells for $28.50 at the furnace.

Manganese Differentials: Basing point prices are subject to an additional charge not to exceed 50c. a ton for each 0.50 per cent manganese content in excess of 1.00 per cent.

WAREHOUSE PRICES

	Pittsburgh	Chicago	Cleveland	Philadelphia	New York	Detroit	Buffalo	Boston	Birmingham	St. Louis	St. Paul	Milwaukee	Los Angeles
Sheets, hot rolled	$3.35	$3.25	$3.35	$3.75	$3.58	$3.43	$3.25	$3.71	$3.45	$3.39	$3.30	$3.38	$5.10
Sheets, cold rolled	....	4.10	4.05	4.05	4.60	4.30	4.30	3.68	....	4.24	4.35	4.23	7.30
Sheets, galvanized	4.65	4.85	4.75	5.00	5.00	4.84	4.75	5.11	4.75	4.99	4.75	4.98	6.30
Strip, hot rolled	3.60	3.60	3.50	3.95	3.96	3.68	3.82	4.06	3.70	3.74	3.65	3.73	....
Strip, cold rolled	3.20	3.50	3.20	3.31	3.51	3.40	3.52	3.46	....	3.61	3.83	3.54	....
Plates	3.40	3.55	3.40	3.75	3.76	3.60	3.62	3.85	3.55	3.69	3.80	3.68	4.95
Structural shapes	3.40	3.55	3.58	3.75	3.75	3.65	3.40	3.85	3.55	3.69	3.80	3.68	4.95
Bars, hot rolled	3.35	3.50	3.25	3.85	3.84	3.43	3.35	3.98	3.50	3.64	3.75	3.63	**4.15
Bars, cold finished	3.65	3.75	3.75	4.06	4.09	3.80	3.75	4.13	4.43	4.02	4.34	3.88	6.60
Bars, ht. rld. SAE 2300	7.45	7.35	7.55	7.31	7.60	7.67	7.35	7.50	....	7.72	7.45	7.58	10.35
Bars, ht. rld. SAE 3100	5.75	5.65	5.85	5.86	5.90	5.97	5.65	6.05	....	6.02	6.00	5.88	9.35
Bars, cd. drn. SAE 2300	8.40	8.40	8.40	8.56	8.84	8.70	8.40	8.63	....	8.77	8.84	8.63	11.35
Bars, cd. drn. SAE 3100	6.75	6.75	7.75	7.16	7.19	7.05	6.75	7.23	....	7.12	7.44	6.98	10.35

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb., galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions: Chicago, galvanized sheets, 500 to 1499 lb.; Philadelphia, galvanized sheets, one to nine bundles, cold rolled sheets, 1000 to 1999 lb.; Detroit, galvanized sheets, 500 to 1499 lb.; Buffalo, cold rolled sheets, 500 to 1500 lb., galvanized sheets, 450 to 1499 lb., cold rolled strips, 0.0971 in. thick; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; Birmingham, hot rolled sheets, strip and bars, plates and shapes, 400 to 3999 lb., galvanized sheets, 500 to 1499 lb.; St. Louis, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb., cold rolled strip 0.095 in. and lighter; Milwaukee, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb., New York, hot rolled sheets, 0 to 1999 lb., cold rolled sheets, 400 to 1499 lb.; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb.; Los Angeles, cold rolled sheets, 300 to 1999 lb., galvanized sheets, 24 ga.—1 to 1499 lb. Extras for size, quality, etc., apply on above quotations. *12 gage and heavier, $3.43. **Over 4 in. wide and over 1 in. thick, $4.95.

CORROSION AND HEAT-RESISTING STEELS

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.73c.	16.15c.	19.13c.	23.38c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hotstrip	17.00c.	17.50c.	24.00c.	25.00c.
Cold st.	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
*Motor	4.95c.
*Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

Silicon strip in coils—Sheet price plus silicon sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 75c. per 100 lb.

*In some instances motor grade is referred to as dynamo grade and dynamo grade is referred to as dynamo special.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, per Package of 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00
25-lb. coating I.C.	8.00	16.00
30-lb. coating I.C.	8.63	17.25
40-lb. coating I.C.	9.75	19.50

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List

Machine and Carriage Bolts:

6½ in., shorter and smaller	65½
6 x ⅝ in., and shorter	63½
6 in. by ¾ to 1 in. and shorter	61
1⅛ in. and larger, all length	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:

(hexagon or square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 to 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full container lots, 10 per cent additional discount.

Stove bolts, packages, nuts loose 71 and 10

Stove bolts in packages, with nuts attached 71

Stove bolts in bulk 80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York lots of 200 lb. or over.

Large Rivets

(½ in. and larger)

Base per 100 lb.

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham $3.75

Small Rivets

(7/16 in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham 65 and 5

Cap and Set Screws

Per Cent Off List

Upset hex. head cap screws U.S.S. or S.A.E. thread, 1 in. and smaller	60
Upset set screws, cup and oval points	68
Milled studs	40
Flat head cap screws, listed sizes	30
Filister head cap, listed sizes	46

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

WIRE PRODUCTS

(To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham)

Base per Keg

Standard wire nails	$2.55
Coated nails	2.55
Cut nails, carloads	3.85

Base per 100 Lb.

Annealed fence wire	$3.05

Base Column

Woven wire fence*	67
Fence posts (carloads)	69
Single loop bale ties	59
Galvanized barbed wire†	70
Twisted barbless wire	70

*15½ gage and heavier. †On 80-rod spools in carload quantities.

Note: Birmingham base same on above items, except spring wire.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes Minimum Wall

(Net base prices per 100 ft., f.o.b. Pittsburgh, in carload lots)

	Seamless Cold Drawn	Hot Rolled	Lap Weld, Hot Rolled
	$	$	$
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb. or ft. over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe)

Base Price = $200 Per Net Ton

Steel (Butt Weld)

	Black	Galv.
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½

Wrought Iron (Butt Weld)

½ in.	24	3½
¾ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18

Steel (Lap Weld)

2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½

Wrought Iron (Lap Weld)

2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17

Steel (Butt, extra strong, plain ends)

	Black	Galv.
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57

Wrought Iron (Same as Above)

½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½

Steel (Lap, extra strong, plain ends)

2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56

Wrought Iron (Same as above)

2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld 8 in. and smaller.

CAST IRON WATER PIPE

Per Net Ton

6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. dock, San Francisco or Los Angeles or Seattle	56.00

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago.

FUEL OIL *

No. 3, f.o.b. Bayonne, N. J.	5.20c.
No. 6, f.o.b. Bayonne, N. J.	3.21c.
No. 6 Bur. Stds., del'd Chicago	4.50c.
No. 3 distillate del'd Cleveland	6.50c.
No. 4 indus., del'd Cleveland	6.00c.
No. 6 indus., del'd Cleveland	5.00c.

This 14,000 Ton Hydraulically Operate Forging Press was recently completed for th National Defense Program, and is the secon huge press of this size designed, built an installed by Mesta in the same plant

MESTA MACHINE COMPANY • PITTSBURGH, PA.

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans, Domestic, 80%, per gross ton (carloads).....$120.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%.....$36.00
Domestic, 26 to 28%..... 49.50

Electric Ferrosilicon

(Per Gross Ton, Delivered Lump Size)

50% (carload lots, bulk).....$74.50
50% (ton lots, packed..... 87.00
75% (carload lots, bulk).....135.00
75% (ton lots, packed).....151.00

Silvery Iron

(Per Gross Ton, base 6.00 to 6.50 Si)

F.O.B. Jackson, Ohio.....$29.50*
Buffalo $30.75*

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphorus or over.

*Official OPACS price established June 24.

Bessemer Ferrosilicon

Prices are $1 a ton above Silvery Iron quotations of comparable analysis.

Ferrochrome

(Per Lb. Contained Cr, Delivered Carlots, Lump Size, on Contract)

4 to 6 carbon.....13.00c.
2 carbon .....19.50c.
1 carbon .....20.50c.
0.10 carbon .....22.50c.
0.06 carbon .....23.00c.

Spot prices are ¼c. per lb. of contained chromium higher.

Silico-Manganese

(Per Gross Ton, Delivered, Lump Size, Bulk, on Contract)

3 carbon $113.00*
2.50 carbon 118.00*
2 carbon 123.00*
1 carbon 133.00*

Other Ferroalloys

Ferrotungsten, per lb. contained W, del'd carload.... $2.00
Ferrotungsten, 100 lb. and less $2.25
Ferrovanadium, contract, per lb. contained V, del'd $2.70 to $2.90†
Ferrocolumbium, per lb. contained Cb, f.o.b. Niagara Falls, N. Y., ton lots..... $2.25†
Ferrocarbontitanium, 15-18 Ti, 7-8 C, f.o.b. furnace, carload, contract, net ton.....$142.50
Ferrocarbontitanium, 17-20 Ti, 3-5 C, f.o.b. furnace, carload, contract, net ton.....$157.50
Ferrophosphorus, electric or blast furnace material, carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage freight, equalized with Rockdale, Tenn., gross ton..... $58.50
Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage, freight equalized with Nashville, gross ton..... $75.00
Ferromolybdenum, per lb. Mo, f.o.b. furnace ..... 95c.
Calcium molybdate, per lb. Mo, f.o.b. furnace..... 80c.
Molybdenum oxide briquettes 48-52 Mo, per lb. contained Mo, f.o.b. Langeloth, Pa.... 80c.
Molybdenum oxide, in cans, per lb. contained Mo, f.o.b. Langeloth, and Washington, Pa. 80c.

*Spot prices are $5 per ton higher.
†Spot prices are 10c. per lb. of contained element higher.

ORES

Lake Superior Ores (51.50% Fe.)

(Delivered Lower Lake Ports)

Per Gross Ton

Old range, bessemer, 51.50.... $4.75
Old range, non-bessemer, 51.50 4.60
Mesaba, bessemer, 51.50..... 4.60
Mesaba, non-bessemer, 51.50... 4.45
High phosphorus, 51.50..... 4.35

Foreign Ores*

(C.i.f. Philadelphia or Baltimore, Exclusive of Duty)

Per Unit

African, Indian, 44-48 Mn..65c. to 66c.
African, Indian, 49-51 Mn..67c. to 69c.
Brazilian, 46-48 Mn.....69c.
Cuban, 51 Mn .....78c.

Per Short Ton Unit

Tungsten, Chinese Wolframite, duty paid, delivered.....$24 to $26
Tungsten, domestic scheelite, at mine .....$24.00 to $25.00
Chrome ore, lump, c.i.f. Atlantic Seaboard, per gross ton; South African (low grade)..Nom.
Rhodesian, 45 .....$32.00
Rhodesian, 48 .....$39.00-$40.00

*Importations no longer readily available. Prices shown are nominal.

COKE*

Furnace

Per Net Ton

Connellsville, prompt ...$6.00 to $6.25

Foundry

Connellsville, prompt ...$6.75 to $7.00

*Maximum coke prices established by OPA became effective Oct. 1, 1941. A complete schedule of the ceiling prices was published in THE IRON AGE, Sept. 25, p. 94B. †F.O.B. oven.

By-product, Chicago $12.25
By-product, New England.....$13.75
By-product, Newark..$12.40 to $12.95
By-product, Philadelphia $12.38
By-product, Cleveland $12.30
By-product, Cincinnati $11.75
By-product, Birmingham .....$8.50†
By-product, St. Louis.....$12.02
By-product, Buffalo $12.50

RAILS, TRACK SUPPLIES

(F.o.b. Mill)

Standard rails, heavier than 60 lb., gross ton.....$40.00
Angle bars, 100 lb..... 2.70

(F.o.b. Basing Points) *Per Gross Ton*

Light rails (from billets)....$40.00
Light rails (from rail steel)... 39.00

Base per Lb.

Cut spikes ..... 3.00c.
Screw spikes ..... 5.15c.
Tie plates, steel..... 2.15c.
Tie plates, Pacific Coast..... 2.30c.
Track bolts, heat treated, to railroads ..... 5.00c.
Track bolts, jobbers discount.. 63-5

Basing points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneaqua, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond, Va.

FLUORSPAR

Per Net Ton

Domestic washed gravel, 85-5 f.o.b. Kentucky and Illinois mines, all rail.....$22.00 to $23.00
Domestic, f.o.b. Ohio River landing barges .....22.00 to 23.00
No. 2 lump, 85-5 f.o.b. Kentucky and Illinois mines...22.00 to 23.00
Foreign, 85% calcium fluoride, not over 5% Si, c.i.f. Atlantic ports, duty paid.....Nominal
Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines.... 31.00
As above, in bags, f.o.b. same mines 32.60

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick *Per 1000*

Super-duty brick, St. Louis...$64.60
First quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois 51.30
First quality, New Jersey..... 56.00
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois 46.55
Second quality, New Jersey.... 51.00
No. 1, Ohio..... 43.00
Ground fire clay, net ton..... 7.60

Silica Brick

Pennsylvania $51.30
Chicago District 58.90
Birmingham 51.30
Silica cement, net ton (Eastern) 9.00

Chrome Brick *Per Net Ton*

Standard, f.o.b. Baltimore, Plymouth Meeting and Chester...$54.00
Chemically bonded, f.o.b. Baltimore, Plymouth Meeting and Chester, Pa. 54.00

Magnesite Brick

Standard f.o.b. Baltimore and Chester $76.00
Chemically bonded, f.o.b. Baltimore 65.00

Grain Magnesite

Domestic, f.o.b. Baltimore and Chester in sacks.....$44.00
Domestic, f.o.b. Chewelah, Wash. (in bulk) 22.00

# of this YODER SLITTING LINE

Changes for slitting metal of different widths must be made frequently.

Such non-productive time is unavoidable, but in the case of Yoder Slitting Lines changeover time is cut to a new low minimum. Production steps up. Costs go down.

Note, in the circle above that one man is using YODER *PATENTED* REMOVABLE SLEEVES to assemble a cutter while the slitting line continues to operate.

When the present run is completed one cutter roll will be slid out and the other inserted — a matter of minutes.

Add this exclusive advantage to the other Yoder features and you will understand why Yoder Slitting Lines are gaining ever wider acceptance in the most efficient mills.

Slitting speeds range from 150 to 250 feet per minute, depending upon gauge and width. Up to 9 cuts may be made in 3/16" gauge 1.00 carbon steel at 150 feet per minute and a greater number of cuts may be made in lighter gauge metals at considerably higher speeds.

Yoder Builds . . . THE YODER COMPANY

5500 Walworth Ave.
CLEVELAND, OHIO

COMPLETE TUBE MILLS · BORING MILLS · BEADING MACHINES · BENDING MACHINES · BRAKE SHOE MACHINES · TENSION REELS · COILERS · UNCOILERS · ROLL-FORMING MACHINES FLYING CUT-OFF MACHINES · SLITTING LINES · SCRAP CUTTERS · POWER HAMMERS

SALES POSSIBILITIES

. . . CONSTRUCTION, PLANT EXPANSION AND EQUIPMENT BUYING

North Atlantic States

● **Cole-Hersee Co.,** 54 Old Colony Avenue, South Boston, electrical and automotive equipment, has asked bids on general contract for new one-story and basement plant, 60 x 125 ft., with wing extension, 18 x 45 ft., at C and Baxter Streets. Cost close to $75,000 with equipment. David J. Abrahams, 260 Tremont Street, Boston, is architect.

Chandler-Evans Co., Evans Avenue, South Meriden, Conn., aircraft equipment and parts, plans new factory at Dayton, Ohio, for production of airplane equipment for government. Cost about $1,145,000, fund in that amount to be secured from Defense Plant Corp., Washington, for land, buildings and machinery.

Vought-Sikorsky Division, United Aircraft Corp., Stratford, Conn., has let general contract to Edwin Moss & Son, Inc., 555 Grant Street, Bridgeport, Conn., for two one-story additions, 75 x 152 ft., and 35 x 70 ft., for storage and distribution. Cost close to $70,000 with equipment. Charles W. Walker, 1115 Main Street, Bridgeport, is architect.

American Steel & Wire Co., Grove Street, Worcester, Mass., has asked bids on general contract for one-story addition at South Works for expansion in machine shop. Cost close to $50,000 with equipment.

War Department, Washington, plans expansion at Camp Edwards, Falmouth, Mass., including one-story shops, storage and distributing buildings, pumping station, water pipe lines and other buildings and utilities. Cost over $3,000,000. Whitman & Howard, Inc., 89 Broad Street, Boston, is architect and engineer.

Connecticut Light & Power Co., Hartford, Conn., is arranging for sale of preferred stock to total about $10,000,000, considerable part of proceeds to be used for expansion in steam-electric generating station at Devon, now under way. Work will include installation of two new turbine-generators and accessories, each 45,000-kw., one to be ready for service in 1942 and other in 1944; high-pressure boilers and auxiliary equipment. Also will extend transmission and distributing lines, and other facilities.

Continental Can Co., 100 East Forty-second Street, New York, has let general contract to Austin Co., Ray Building, Oakland, Cal., for one-story addition to branch plant at Eighth and Taylor Streets, San Jose, Cal. Cost over $300,000 with equipment.

Navy Department, Washington, plans new naval reserve training center at New York State Merchant Marine Academy, Fort Schuyler, New York, including shops, naval school building and other structures and facilities. Cost about $400,000 with equipment. Fund in that amount is being arranged.

Ryan Ready Mixed Concrete Corp., Smith and Ninth Streets, Brooklyn, has leased 25,000 sq. ft. on Newtown Creek for new concrete-mixing plant and yards, with mixing machinery, conveyors, loaders and other equipment.

Carbide & Carbon Chemicals Corp., 30 East Forty-second Street, New York, plans new works at Charleston, W. Va., on Kanawha River, near Charleston airport, for production of butadiene, a basic ingredient of synthetic rubber, for government. It will comprise one and multi-story main units for processing such material from petroleum gases, storage and distribution buildings, machine shops, steam power house and other structures. Plant will be operated in conjunction with present works of company at South Charleston. Cost about $3,500,000 with equipment, fund in that amount to be secured through Defense Plant Corp., Washington.

Taggart Corp., 230 Park Avenue, New York, kraft paper products, kraft paper bags and containers, etc., has let general contract to C. M. Guest & Sons, Anderson, S. C., for new converting mill at Franklin, Va., for production of heavy-duty paper bags for handling chemicals, building materials, etc. Cost about $500,000 with machinery. J. E. Sirrine & Co., 215 South Main Street, Greenville, S. C., are architects and engineers.

Symington-Gould Corp., 20 Symington Place, Rochester, N. Y., iron castings, railroad equipment, etc., has plans by William G. Kaelber and L. A. Waasdorp, 311 Alexander Street, architects, for one-story addition for production of tank armor plate for government, recently noted, and will take bids soon on general contract. Cost about $1,255,100, of which $750,000 will be expended for equipment, and remainder for building. Gross fund in amount noted will be provided by Defense Plant Corp., Washington, for project.

Curtiss-Wright Corp., Airplane Division, Buffalo, has leased four-story building at 630 High Street for new training school for shop mechanics.

Northern Coca-Cola Bottling Works, Inc., 162 Main Street, Massena, N. Y., plans new two-story mechanical-bottling, storage and distributing plant, about 75 x 200 ft. Cost over $75,000 with equipment. E. J. Manson, Ridgewood Avenue, is architect.

Wallace & Tiernan Co., Inc., 11 Mill Street, Belleville, N. J., chlorine control and water purification equipment, has let general contract to Mahony-Troast Construction Co., 657 Main Avenue, Passaic, N. J., for one-story addition, 60 x 220 ft., for storage and distribution. Cost over $50,000 with equipment. W. C. Pattison, 133 Van Houten Avenue, Passaic, is architect. Company also has leased one-story building, on site about 100 x 150 ft., at 537-45 Franklin Avenue, Nutley, N. J., for new factory branch, storage and distributing plant.

Gus Reinke Machinery & Tool Co., 63 Dickerson Street, Newark, N. J., tools, dies, special machinery, etc., plans new one-story plant for production of equipment for government. Cost about $120,600. Fund in that amount will be secured through Defense Plant Corp., Washington.

Morningstar-Nicol, Inc., Utter and Fourth Avenues, Hawthorne, N. J., starch, dextrines, glues, etc., has let general contract to Edward Reihl Co., 95 Delaware Avenue, Paterson, N. J., for two-story addition, about 60 x 80 ft. Cost over $55,000 with equipment. John J. Sheridan, 18 East Forty-first Street, New York, is architect. Main offices are at 630 West Fifty-first Street, New York.

Sier-Bath Co., 9250 Hudson Boulevard, North Bergen, N. J., gears, sprocket wheels, etc., has let general contract to Bonanno Construction Co., Inc., 8533 Tonnelle Avenue, for one-story addition. Cost close to $55,000 with equipment.

Board of Education, Clifton, N. J., plans two-story addition to high school on Piaget Avenue, for a vocational school unit. Cost over $400,000 with equipment. Financing is being arranged through Federal aid. Hugh A. Kelly & Associates, 219 East Hanover Street, Trenton, N. J., are architects and engineers.

Andale Co., 1600 Arch Street, Philadelphia, condensers, lubricating oil coolers, valves and kindred engineering products, plans rebuilding part of plant at Lansdale, Pa., recently destroyed by fire, comprising main two and three-story unit, given over to production of power equipment for government. Loss close to $450,000 with machinery.

Landis Tool Co., Waynesboro, Pa., grinding machinery and parts, plans one-story addition, about 170 x 305 ft., primarily for a foundry. Cost over $400,000 with equipment.

Department of Supplies and Purchases, City Hall Annex, Philadelphia, Charles H. Grakelow, director, asks bids until Dec. 1 for steel road forms (Class 644), cast iron bases (Class 645), control valves (Class 646); also for bolts, nuts, rivets, washers and machine screws (Class J), and pipe and fittings (Class N), required for six months' period, Jan. 1 to June 30, 1942.

Ajax Iron Works, Inc., Corry, Pa., engines and parts, car movers and other heavy equipment, has approved plans for one-story addition, about 55 x 150 ft., primarily for a machine shop. Cost over $75,000 with equipment.

Superior Steel Products Co., Monaca, Pa., cold drawn steel products, plans new one-story plant for production for government, to include a large annealing unit. Cost about $225,000. Fund in that amount will be secured through Defense Plant Corp., Washington, for building and machinery.

United States Engineer Office, New Post Office Building, Pittsburgh, asks bids until Dec. 8 for one-story district storehouse at U. S. Boatward Lock No. 4, Monongahela River, Charleroi, Pa., including electrical system, etc. (Circular 254).

A. & P. Food Stores, Inc., 420 Lexington Avenue, New York, has leased one-story building to be erected at 230 North Franklintown Road, Baltimore, for new local bulk storage and distributing plant. Cost close to $500,000 with mechanical-handling, loading and other equipment. Erection contract has been let to Turner Construction Co., Architects' Building, Philadelphia.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Dec. 2 for screws and nuts for Eastern and Western Navy yards (Schedule 9388), high-pressure air reducing valves for Brooklyn and Mare Island yards (Schedule 9341); until Dec. 4, two separate electric generating plants, 1000-hp. motors and accessories, exciter set and other electrical equipment for wind tunnels for aircraft at experimental plant, Carderock, Md. (Schedule 9484).

Bureau of Yards and Docks, Navy Department, Washington, asks bids (no closing date stated) for one 250-ton and one 150-ton electric traveling bridge cranes for naval proving ground, Dahlgren, Va. (Specification 10276).

The South

● **International Agricultural Corp.,** 61 Broadway, New York, commercial fertilizers, chemical products, etc., plans new mining and phosphate recovery plant at Bartow, Fla., where about 500 acres of phosphate lands have been leased. Plant will include storage and distributing buildings, machine shop and other structures. Cost over $100,000 with equipment.

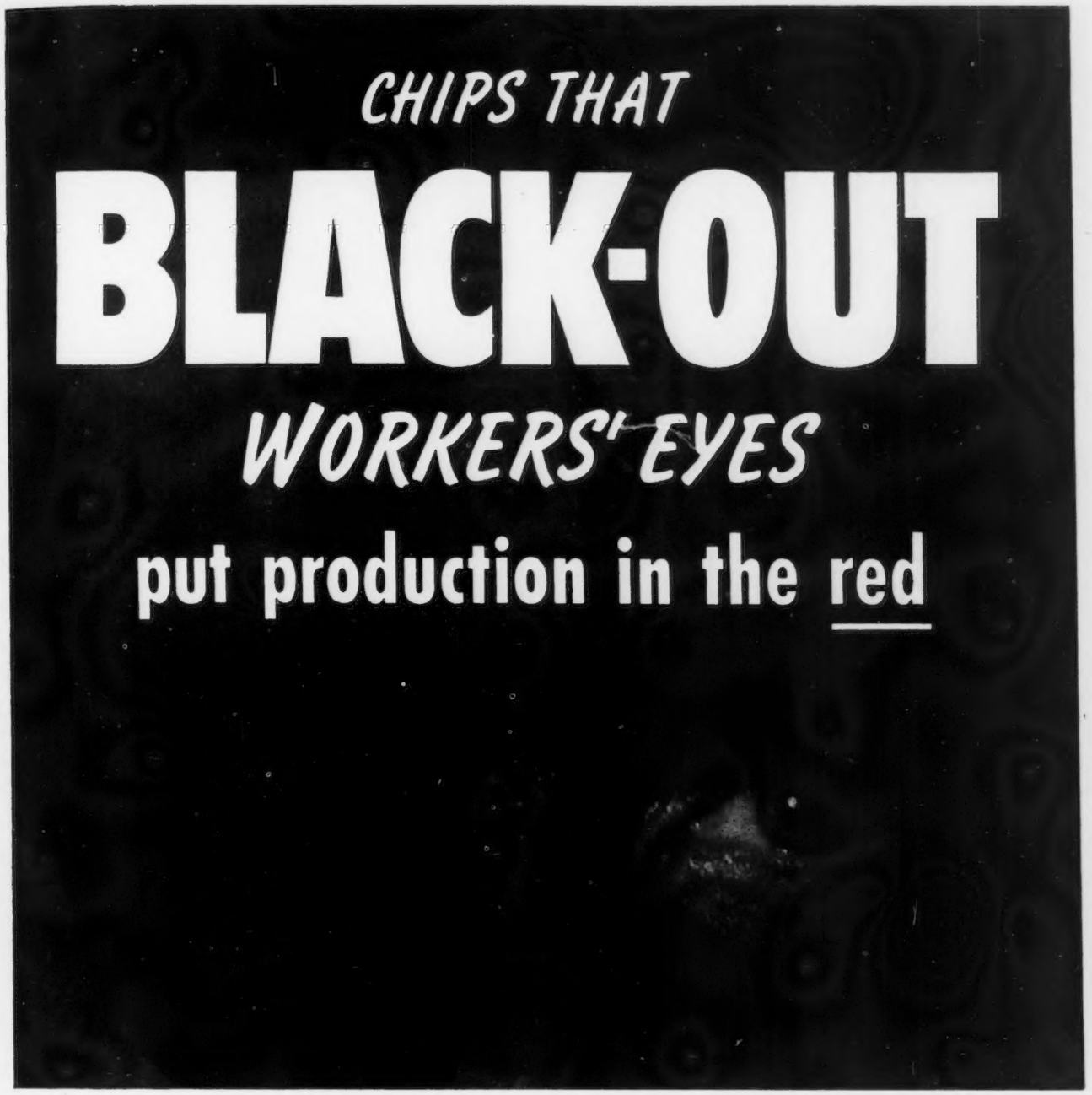
Pendleton Shipyard Co., Inc., New Orleans, recently organized by Pendleton E. Lehde, Masonic Temple Building, engineer, and associates, plans new shipbuilding plant on industrial canal, comprising four 200-ft. shipbuilding berths, outfitting dock, several one-story warehouses, one-story construction and assembling shops, office building and other structures. Cost close to $550,000 with equipment. Proposed to use plant for construction of vessels for United States Maritime Commission, Washington. Barnard-Godat & Heft, Terminal Station Building, are consulting engineers.

Kilby Steel Co., Anniston, Ala., plans expansion for production of ordnance for government, and will expend about $40,000 for additional equipment. Fund in that amount will be furnished by Defense Plant Corp., Washington.

McKamie Gas Cleaning Co., McKamie, Ark., recently organized joint subsidiary of Atlantic Refining Co., 260 South Broad Street, Philadelphia, and Carter Oil Co., Tulsa, Okla., plans new gas desulphurization plant in McKamie gas field district, Lafayette County, for handling "sour gas" for purification service for fuel supply for new electric-generating station to be built in that area by Arkansas Power & Light Co., Pine Bluff, Ark. It will comprise several extraction units, compressor station and other structures, with pipe line system. Cost about $500,000 with machinery.

Old Colonel Distillery, 715 West Main Street, Louisville, has let general contract to Burkhead & McGuire, Inc., Boston, Ky., for six-story addition, 70 x 80 ft., to distilling plant at Midway, Ky., for storage and distribution. Cost close to $75,000 with equipment.

Gulf Refining Co., Gulf Building, Houston



Give your workers AO Goggles

A black patch can cover up a sightless eye but nothing can hide the consequences of the accident. If workers' eyes are unprotected, chips can rob you of the services of urgently needed men, add thousands of dollars to costs, upset company morale, *set back National Defense.*

American Optical Company offers you a complete line of goggles, each of which has been scientifically designed to protect from specific kinds of eye hazards. Each American goggle is strong and safe, yet light, cool, comfortable. Equipped with deep-curved Super Armorplate Lenses, they offer greater resistance to impact. Ask your AO Safety Representative to show you the complete American Line.

American Optical Company

Southbridge, Massachusetts

MANUFACTURERS, FOR MORE THAN 100 YEARS, OF PRODUCTS TO AID AND PROTECT VISION

233

Tex., will expend close to $1,000,000 for expansion at oil refinery at Port Arthur, Tex., instead of smaller sum previously noted, work to include new production unit for high-test gasoline for aviation service, with cracking department, iso-octane unit for production of blending ingredients, steel tank storage facilities and other work. Main offices are in Gulf Building, Pittsburgh.

Central States

• **William Powell Co.**, 2525 Spring Grove Avenue, Cincinnati, valves and kindred engineering specialties, has let general contract to M. Marcus Building Co., 2109 Reading Road, for three-story addition to plant on Colerain Avenue. Cost close to $70,000 with equipment. Tietig & Lee, 34 West Sixth Street, are architects.

Barth Stamping & Machine Works, Inc., 3815 West Thirty-fourth Street, Cleveland, plans two-story addition, about 40 x 80 ft., for expansion in machine shop. Cost close to $40,000 with equipment. Ernest McGeorge and William R. Hargett, 9400 Quincy Avenue, are architects and engineers.

Wellman Bronze & Aluminum Co., 2525 East Ninety-third Street, Cleveland, bearings, bushings, castings, etc., plans expansion in foundry for production of magnesium castings for government, to cost about $110,000. Fund in that amount will be secured through Defense Plant Corp., Washington.

Ranco, Inc., 561 West Fifth Avenue, Columbus, Ohio, electrical products, has let general contract to Frank I. Matthaes, 427 East Dunedin Road, for one-story addition. Cost close to $40,000 with equipment.

Twin Coach Co., Kent, Ohio, motor buses and parts, will begin superstructure soon for one and two-story addition, about 150 x 250 ft., with one-story extension, 40 x 60 ft., for which general contract recently was let to H. K. Ferguson Co., Cleveland. It will be used for parts production and assembling of new trailer fire-pumper, and other divisions. Cost over $150,000 with equipment.

Standard Brewing Co., 5800 Train Avenue, Cleveland, has let general contract to Thomas Berry, 17214 Ernadale Avenue, for one-story addition for storage and distribution. Cost close to $40,000 with equipment.

American Stove Co., Lorain Division, Long Avenue, Lorain, Ohio, stoves and ranges, parts, etc., will build one-story addition, 120 x 235 ft., for expansion in production, storage and distribution departments. Cost over $100,000 with equipment. James C. F. Shafer Co., Caxton Building, Cleveland, has general contract.

E. I. du Pont de Nemours & Co., Inc., Explosives Department, Wilmington, Del., has arranged with War Department, Washington, for new plant for production of high explosives on about 18,000 acres near Montezuma, vicinity of Terre Haute, Ind., fronting on Wabash River. It will comprise one and multi-story production units, with machine shops, power house, pumping station, administration building and other structures. Cost about $53,000,000, fund in that amount to be furnished by Defense Plant Corp., Washington. Plant will be known as Wabash River Ordnance Works.

Chapman Knives & Saws, Inc., 504 South Broadway, St. Louis, has asked bids on general contract for new one-story plant, about 65 x 125 ft., at Lawton and Ewing Streets. Cost over $65,000 with equipment. Emil H. Niemann, 3816 Shaw Avenue, is architect.

Firestone Tire & Rubber Co., 2001 Grand Avenue, Kansas City, Mo., has leased one-story building, about 63,000 sq. ft. of floor space, to be erected at Fourteenth and Swift Streets, North Kansas City, by North Kansas City Development Co., Railway Exchange Building, for new factory branch, storage and distributing plant. Cost over $100,000 with equipment. General contract has been let to Hiram Elliott Construction Co., Pioneer Trust Building.

Monsanto Chemical Co., 1700 South Second Street, St. Louis, plans new works near Galveston, Tex., for production of chemicals used in manufacture of synthetic rubber for government. It will include storage and distributing buildings, machine shop, steam power house, office building and other structures. Cost about $2,200,000, fund in that amount to be furnished by Defense Plant Corp., Washington.

National Broach & Machine Co., 5600 St. Jean Street, Detroit, broaches and kindred mechanical products, has let general contract to Barton-Malow Co., 2631 Woodward Avenue, for one-story addition, and improvements in present plant. Cost close to $40,000 with equipment.

Dow Chemical Co., Midland, Mich., plans one-story addition, 100 x 200 ft., to branch plant at Bay City, Mich., operated by Dowmetal Division, for expansion in magnesium fabrication department. Cost over $85,000 with equipment.

Bohn Aluminum & Brass Corp., Lafayette Building, Detroit, bronze bearings, aluminum, brass and other metal castings and forgings, has arranged with War Department, Washington, for construction and operation of two new plants for production of extruded aluminum products, to be located at Adrian, Mich., and Los Angeles, respectively. Each will consist of a main one-story manufacturing unit and smaller buildings for storage, distribution and other service. Adrian mill will cost approximately $3,935,000, of which about $2,520,000 will be used for equipment, and remainder for land and buildings; Los Angeles plant will represent investment of about $5,538,000, of which $3,785,000 will be expended for equipment, and $1,753,000 for land and buildings. Gross fund of $9,473,000 for both projects will be furnished by Defense Plant Corp., Washington.

Holley Carburetor Co., 5930 Vancouver Street, Detroit, will begin superstructure soon for one-story addition for production of aircraft equipment for government, for which general contract was let recently to Austin Co., Cleveland. Cost close to $190,000 with machinery.

Atlas Imperial Diesel Engine Co., Mattoon, Ill., diesel engines and parts, has approved plans for one-story addition. Cost about $45,000 with equipment.

Sheet Metal Engineering Co., 919 West Forty-ninth Place, Chicago, sheet metal products, parts, etc., has let general contract to Little & Zwiers, 8228 South Justine Street, for one and two-story addition, 46 x 125 ft. Cost over $65,000 with equipmnt. William Sevic, 1900 Blue Island Avenue, is architect.

A. O. Smith Corp., 3533 North Twenty-seventh Street, Milwaukee, has let contract to C. Hennecke Co., 3225 North Pierce Street, for one-story addition to building No. 111, North Thirty-fifth and West Hopkins Streets, 95 x 135 ft. Cost over $85,000 with equipment.

White Cap Co., 1806 North Central Avenue, Chicago, metal products, has let general contract to Campbell, Lowrie, Lautermilch, Inc., 400 West Madison Street, for new one and three-story plant, 100 x 200 ft., with foundations for additional stories later, at Central, Major and Bloomingdale Avenues. Cost over $200,000 with equipment.

American Zinc Co. of Illinois, Inc., Cookson Road, East St. Louis, Ill., plans expansion for production for government for output of electrolytic slab zinc and retort slab zinc; also auxiliary one-story structures for storage, distribution and other service. Entire project will cost about $4,000,000, fund in that amount to be secured through Defense Plant Corp., Washington.

Ampco Metal, Inc., 1745 South Thirty-eighth Street, Milwaukee, bearings, bushings, castings, etc., has let contract to Keierleber Construction Co., Inc., 2249 North Forty-eighth Street, for one-story forge and machine shop, about 120 x 220 ft., and power house. Cost over $200,000 with equipment.

Triangle Package Machinery Co., 906 North Spaulding Avenue, Chicago, has let general contract to Paul Sather, 2825 McLean Avenue, for one-story addition, about 34 x 115 ft. Cost close to $40,000 with equipment.

Denison Engineering Co., 119 West Chestnut Street, Columbus, Ohio, has purchased 26-acre tract on outskirts of city for erection of new plant which will provide about 50,000 sq. ft. of floor space. Company is producing defense equipment for government and new facilities are expected to be in operation within 60 to 90 days. Company's other plants will be continued as heretofore.

Defense Plant Corp., Washington, will erect a $3,000,000 plant for Westcott Valve Co. at East St. Louis, Ill., for production of steel castings for Navy. It will include foundry, machine shop and testing laboratory, and is expected to employ 700 men. Westcott company is filling orders for pipe lines, and also has Navy contracts totaling $600,000.

Western States

• **Western Gear Works of California, Inc.**, 11,183 Long Beach Boulevard, Lynwood, Cal., gears, transmission systems, etc., will take bids soon on general contract for new local plant with main one-story unit, 112 x 360 ft., and office building adjoining, 45 x 112 ft. Cost over $175,000 with equipment. J. H. Davies, Ocean Center Building, Long Beach, Cal., is engineer.

Vulcan Foundry Co., 4401 San Leandro Street, Oakland, Cal., steel castings, has approved plans for one-story addition. Cost about $45,000 with equipment.

Clarke Aero-Hydraulics, Inc., 177 North Hill Avenue, Pasadena, Cal., hydraulic equipment for aircraft, plans expansion for production of equipment for government, including machinery estimated at $87,500. Fund in that amount will be secured through Defense Plant Corp., Washington, for project.

American Screw Products Co., 7000 Avalon Boulevard, Los Angeles, has let general contract to E. S. McKittrick Co., 7839 Santa Fe Avenue, Huntington Park, Cal., for one-story addition. Cost close to $40,000 with equipment.

Tacoma School Board, Central Grade School Building, Tacoma, Wash., will take bids soon on general contract for one-story, U-shaped vocational school, 75 x 240 ft., on site bounded by South Eleventh, Twelfth, G and H Streets, with foundations for a second story later. Cost about $42,000 exclusive of equipment. Financing is being arranged through Federal aid. Other units will be built at same location later. Mock & Morrison, Perkins Building, are architects.

Pacific Steel Casting Co., 1316 Second Street, Berkeley, Cal., plans one-story addition for expansion in foundry. Cost close to $45,000 with equipment.

Canada

• **Canadian Acme Screw & Gear, Ltd.**, 207 Weston Road South, Toronto, gears, transmission systems and other mechanical equipment, has let general contract to Redfern Construction Co., Ltd., 36 Toronto Street, for one-story main addition. Cost over $500,000 with equipment. Chapman & Oxley, 372 Bay Street, are architects.

Pearson Wire & Iron Works, Ltd., 2105 Franklin Street, Vancouver, B. C., plans one-story addition. Cost close to $50,000 with equipment.

Small Arms, Ltd., Lake Shore Road, Long Branch, near Toronto, fire arms, is erecting one-story addition, for which general contract has been let to Foundation Co. of Ontario, Ltd., 1158 Bay Street, Toronto. Cost over $250,000 with equipment.

Morton Engineering & Drydock Co., Ltd., Louise Embankment, Quebec, Que., has awarded general contract to Mathieu & Sylvain, 44 Ste. Ursule Street, and placed several subawards for extension to drydock and engineering plant to cost $200,000. Preliminary work is underway. Equipment contracts are still to be placed.

Long Mfg. Co., Ltd., 2744 Edna Avenue, Windsor, Ont., radiators, has plans for an addition, to cost about $65,000 with equipment.

Department of Munitions and Supply, Ottawa, H. H. Turnbull, secretary, has received bids for construction of a shell case plant at Windsor, Ont., to be operated by Canadian Motor Lamp Co., Ltd., 2429 Seminole Street. Cost about $1,000,000 with equipment.

Alliance Paper Mills, Ltd., Merritton, Ont., has awarded general contract to Redfern Construction Co., Ltd., 36 Toronto Street, Toronto, for alterations to Lybster Division to cost $100,000.

Massey-Harris Co., Ltd., 915 King Street West, Toronto, has awarded general contract to A. W. Robertson, 57 Bloor Street West, for aircraft assembly plant at Weston, Ont., to cost $125,000, equipment extra.

Canada Steamship Lines, Ltd., 715 Victoria Square, Montreal, will rebuild power plant at Midland, Ont., to cost about $60,000 with equipment.

THE IRON AGE

November 27, 1941

Allocations and Priorities Section

What Priorities Mean—Which Forms to Use

HOW TO USE THIS GUIDE—The following information is given in this guide:

1—An index alphabetically arranged listing all material and equipment in the metal working industry affected by government price, priority or allocation orders. Following each subject is a list of orders relating to the item. For details of the type of control in force refer to the orders indicated. (Page 1.)

2—A list of priority orders issued to date, together with a description of the order, the official forms to be used in connection with the order, and a description of the method to be used in extending the rating granted by the order. (Page 3.)

3—A tabulation, alphabetically arranged, of preference ratings granted by the various preference orders. (Page 9.)

4—A detailed explanation of how to extend priority orders, to be used in connection with item 2 above. (Page 8.)

5—A list of OPA price ceilings affecting the metal working industry. (Page 5.)

6—A description of the forms to be used with the priority orders. (Page 6.)

7—A table telling when and by whom the various forms affecting the metal industry should be filed. (Page 10.)

8—Names and addresses of priority specialists in Washington for various commodities. (Page 12.)

9—Locations and names of managers of all priority field offices established to date. (Page 12.)

DEFINITION OF TYPES OF ORDERS—M-Orders—Indicated by letter M preceding the serial number. These orders are designed to regulate the distribution of a material to assure defense needs being filled first, then other uses in the sequence of their importance. These orders can place all shipments under the control of the Priorities Director; set up an emergency pool and allow balance of output go free, or control usage through rate of production.

P-Orders—Indicated by letter P preceding serial number. These are intended to give buyers, users, or manufacturers of defense or essential civilian needs preference over ordinary civilian requirements in procurement of material for the specified products.

E-Orders—Identified by letter E. These are designed to regulate the distribution of equipment, as contrasted with M orders which regulate the flow of material.

L-Orders—Identified by letter L. These orders restrict production of specified products and materials and set permissible output schedules.

S-Orders—Identified by letter S. These suspend a plant's operations completely for a given period. Only one issued to date.

Price Orders—These orders, indicated by the letters PS in the index following, establish maximum prices at which various items may be sold. They do not set a minimum.

Miscellaneous orders—These cover special conditions which do not lend themselves to control by the regular orders.

Index to Material and Equipment

(Symbols P, M, L and E refer to priority orders; PS indicates a price schedule)

Aircraft—P-3, P-4, P-6-a, P-13, P-9-a, P-9-b, P-9-c, P-9-d, P-9-e, P-9-f, P-47, P-52
Acetic Acid—PS-31
Acetone—PS-36
Alcohol, Related Compounds — M-30, M-31, PS-34, PS-28, PS-36, PS-37
Alloy Steel and Iron—see **Steel**
Aluminum—M-1, M-1-a, M-1-b, M-1-c, P-12, S-1
Aluminum Scrap—PS-2, P-12
Automobiles—P-57, P-54, L-1, L-1-a, L-2, L-2-b, L-2-c, L-4, P-57
Bombers—see **Aircraft**
Bomb Sights—P-9-c
Borax, Boric Acid—M-7, M-7-a
Brass Mill Scrap—PS-12
Bridge Brakes—P-5
Bright Work (on automobiles)—L-2-b
Burlap—PS-18
Buses—P-54, L-1, L-1-a
Butyl Alcohol—PS-37
Calcium-Silicon—M-20
Canning Machinery and Equipment — P-17, P-42, P-42-a, P-51
Carbon Tetrachloride—see Chlorinated Solvents
Castings—PS-41, see also **Steel**
Cellophane—L-20
Cellulose Derivatives—L-20
Charitable Institutions—see **Repairs**
Chemical Plants—see **Repairs**
Chemicals — see specific headings, as **Chlorinated Solvents**, etc.
Chlorinated Hydrocarbon Refrigerants—M-28
Chlorinated Rubber—M-46
Chlorinated Solvents—M-41
Chlorine—M-19, L-11
Chromium—M-18, M-18-amend.
Civil Aircraft—P-6-a
Coal—PS-27, PS-5
Cobalt—M-39
Coke—PS-29
Coke Plants—see **Repairs**
Cooperage—P-79
Conveyors—P-78
Copper—M-9, M-9-a, M-9-b, M-9-c, PS-15
Copper Mines (South American)—P-58.
Copper Scrap—P-61, PS-20, M-9-b
Cordage—M-36
Cork—M-8
Cranes (inc. hoisting equipment)—P-1, P-5, P-5-a
Cutting Tools—E-2, P-18, P-18-a—see also **Machine Tools**
Dairy Equipment—(A-5 rating granted for material for hot-dipped tinned and tin plate dairy equipment in OPM release No. PM1458 dated Oct. 28, 1941. No official order issued as yet. Make applications for ratings on Pd-1

HOW TO MAKE REVISIONS

Revisions for this IRON AGE Priorities Guide will be given to you each week in THE IRON AGE. They will be found on the Priorities and Prices page, which appears in every issue. This guide replaces other priority sections and charts appearing in THE IRON AGE previous to the issue of Nov. 27.

THE IRON AGE, 100 E. 42nd St., New York, N. Y.

Copyright, 1941

Defense Projects—P-19, P-19-a, P-19-b, P-19-c, P-19-d, P-41, P-55.
Defense Supplies Rating Plan—P-6
Diesel Engines—see **Gasoline Engines**
Distributers—see **Warehouses**
Douglas Fir Logs—PS-13
Douglas Fir Lumber—PS-26
Drums—P-76, M-45

Electric Power—L-16
Electrical Relays (inc. Solenoid Assemblies)—P-15
Elevators—P-72
Escalators—P-72
Ethyl Alcohol—M-30, PS-28
Ethylene Dichloride—see **Chlorinated Solvents**

Farm Machinery—P-32, P-33
Ferroalloys—see **Steel** and **Tungsten**
Fire Fighting Apparatus—P-45
Formaldehyde, other **Synthetic Resins**—M-25, PS-21
Foundry Equipment—P-31
Freight Cars—P-8
Fuel, Motor—L-8
Furniture, Metal—L-13

Gasoline and Diesel Engines—P-25-a, P-26-d
Glycerine—PS-38
Gunfire Controls—P-9-e
Guns—P-25-c, P-26-c
Gun Turrets—P-9-d

Hardware—PS-40
Health Supplies—P-29
Hexamethylenetetramine—M-25
High Speed Steel—M-14
Highway—P-19-e—see also **Repairs**
Housing Projects—P-19-c, P-19-d and P-55
Hydraulic Bridge Brakes—P-5

Industrial Lift Trucks—P-40
Insect Cloth—PS-40
Inventory Control—See **Miscellaneous Orders**
Iron—PS-10. See also **Steel**
Iron and Steel Industry—P-68
Ironers—L-6
Iron Scrap—M-24, PS-4

Jobbers—see **Warehouses**

Lead—M-38, M-38-a
Lift Trucks—P-40
Locomotives—P-20, P-21
Lumber—PS-19, PS-26, PS-13

Machine Tools—P-2-a to P-2-s, P-11, P-11-a, P-18, P-18-a, P-39, E-1, E-sup., E-2—see also **Cutting Tools, Welders** and **Rebuilt Machine Tools**
Machine Tools, Second-Hand—PS-1
Machinery—see specific classifications as **Textile, Farm,** etc. See also **Repairs**
Magnesium—M-2, M-2-a, M-2-b
Manila Fibre, Cordage—M-36
Milk Cans—See **Dairy Equipment**
Metal Furniture—L-13
Metal Working Equipment—P-11, P-11-a. See also **Machine Tools** and **Cutting Tools**
Metal Working Equipment—see **Machine Tools**
Methyl Alcohol—M-31
Mining—P-23, P-56, P-58
Motor Fuel—L-8

Neoprene—see **Rubber**
Nickel—M-5, M-5-a, M-5-b, M-6, M-6-a, M-21, M-21-a
Nickel Scrap—PS-8

Oil, Crude—PS-22

Paper, Paperboard—L-11, PS-32
Paraformaldehyde—M-25
Perchlorethylene—see **Chlorinated Solvents**
Phenols—M-27
Phosphorus Oxychloride—M-35
Pig Iron—M-17, PS-10
Polyvinyl Chloride—M-10
Potassium Perchlorate—M-32
Potassium Permanganate—M-33
Propellers—P-4, P-9-c
Pulp—L-11

Quarries—see **Repairs**

Radio (inc. receiving, transmitting, directional equipment)—P-16
Radio Broadcasting and Communication (not inc. home receiving sets)—see **Repairs**
Radiosondes—P-38
Railroad Equipment—see **Freight Cars,** also **Locomotives**
Railroad Specialty Castings—PS-40
Rebuilt Machine Tools—P-77
Refrigerants—M-28
Refrigerators—L-5, L-7
Repairs including maintenance and operating supplies—P-22 (includes any Government unit; any individual, partnership, association, corporation, or other form of enterprise engaged in one or more of the following activities or acting in one or more of the following capacities to the extent that it is so engaged or so acts:—manufacturing, processing, or fabricating; warehousing; wholesaling; charitable institutions; carriers — urban, suburban and interurban common or contract carriers of passengers or freight by electric railway, electric coach, motor truck, or bus, including terminals; shipping—commercial carriers of freight and passengers by ocean, lake, river, or canal, including terminals; educational institutions; printers and publishers; commercial radio broadcasting and communications; telephone and telegraph communications; hospitals, clinics and sanatoriums; petroleum—inc. natural gas and hydrocarbons associated with petroleum; privately owned irrigation systems, toll bridges, toll canals; also organizations using tools or equipment for repairing property of producers); see also P-68.
Research—P-24, P-43—See also **Repairs**
Rubber (inc. Neoprene)—M-4, M-4-m, M-13, M-15, M-15-a, M-46
Rubber and Rubber Products—see **Repairs**

Secondary Aluminum—PS-2
Shipbuilding (inc. Shipways)—P-7, P-10 (material for ship conversion), P-14-a, P-14-b, see also **Repairs**
Solenoids—see **Electrical Relays**
South American Copper Mines—P-58
Stainless Steel—see **Steel**
Steel—M-21, M-21-a, M-21-b, (includes ingots, blooms, slabs, billets, forgings, carbon and alloy steel castings, wrought iron, all semi-finished and finished rolled or drawn carbon and alloy steels) PS-6, PS-41, M-14
Steel Drums—P-76, M-14
Steel and Iron Industry—P-68
Steel Scrap—M-24, P-61, PS-4
Superchargers—P-9-f
Supplies, Defense Rating Plan—P-6
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Synthetic Resins—M-25

Tackle Blocks—P-75
Tanks (military)—P-25-a, P-25-b, P-25-c, p-25-d, P-25-e, P-26, P-26-a, P-26-b, P-26-c, P-26-d, P-26-e
Textile Machinery—P-53
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Toluene—M-34
Tools—See **Machine Tools** and **Cutting Tools**
Trailers—P-54, L-1-a
Transport Facilities (air)—P-47
Tricresyl, Triphenyl Phosphates—M-16
Trichlorethylene—see **Chlorinated Solvents**
Trucks (inc. trailers, busses, etc.)—P-57, P-54, L-1, L-1-a, L-3, L-3-a, L-3-b, L-4
Tungsten (inc. ferrotungsten, metal powder, compound)—M-3, M-3-a, M-14, M-29, M-29-a

Utilities—P-46

Vanadium—M-23

Warehouses — M-21-b, P-6, see **also Repairs**
Washers and Ironers—L-6
Waste Paper—L-15, PS-30, PS-32
Welding Machines—P-39
Wood Containers—P-79
Wrought Iron—see **Steel**

Zinc—M-11, M-11-a, M-11-b, M-11-c, M-11-d
Zinc Scrap—PS-3

Description of Priority Orders

(See "FORMS TO USE WITH PRIORITY ORDERS," page 6, for description of forms listed under column Related Form. For information on ratings assigned by these orders, see page 9. See section "HOW TO EXTEND PRIORITY ORDERS TO SUPPLIERS," page 8, for explanation of key letters under column How Extended. Numbers in brackets refer to effective date.)

"P" Orders

Order Number	Material Covered	Related Form	How Extended
P-1	Material for production of electric traveling cranes (3-12) *Revoked by P-5.*		
P-2 to P-2-s	Material for production of machine tools (3-28). *Revoked by P-11.*	PD-6	
P-3	Material for production of airframes (4-29)	PD-13	G
P-4	Material for production of airplane engines and propellers (4-29)	PD-14	G
P-5	Material entering into production of cranes and hydraulic bridge brakes (5-26) *Revokes P-1*		F
P-5-a	Material for production of cranes and hoisting equipment (8-1) *Supersedes P-5*		
P-5-b	Material for production of cranes and hoisting equipment (11-1) *Supersedes P-5-a*		
P-6	Defense supplies rating plan (5-31)	PD-25, PD-25-a, PD-25-b, PD-25-c, PD-25-d	F
P-6-a	Civil aircraft, repair parts and accessories (7-21)		
P-7	Material and equipment entering into production of merchant ship construction (6-12)	PD-30, PD-30-a	D
P-8	Material for freight car construction (6-18)	PD-38, PD-38-a	D
P-9-a	Materials entering into the production of airframes for heavy bombers (6-26)	PD-43, PD-43-a	G
P-9-b	Aircraft engines for heavy bombers (6-26)	PD-44, PD-44-a	G
P-9-c	Aircraft propellers for heavy bombers (6-26)	PD-45, PD-45-a	G
P-9-d	Gun turrets for heavy bombers (6-30)	PD-46, PD-46-a	G
P-9-e	Gun sights, bomb sights, gunfire controls for heavy bombers (6-30)	PD-47, PD-47-a	G
P-9-f	Turbo superchargers for heavy bombers (6-30)	PD-48, PD-48-a	G
P-10	Material and equipment entering into conversion of ships (6-19)	PD-41, PD-41-a	
P-11	Material for production of metal working equipment (7-1) *Superseded by P-11-a*	PD-42, PD-42-a	H
P-11-a	Material for production of metal working equipment (9-30) *Revokes P-11*	PD-81, PD-115	F
P-12	Aluminum scrap (6-26)	PD-40	E
P-13	Material for production of airframes (7-3)	PD-52, PD-52-a	G
P-14-a	Material and equipment for construction of shipways in 1941 (7-12)	PD-56, PD-56-a	D
P-14-b	Material and equipment for construction of shipways in 1942 and 1943 (7-12)	PD-56, PD-56-a	D
P-15	Material for electrical relays and solenoid assemblies (7-11)	PD-57, PD-57-a	G
P-16	Material for commercial radio equipment (7-11)	PD-58, PD-58-a	G
P-17	Material for production of canning machinery. *Expired Aug. 31, 1941*		F
P-18	Material entering into production of cutting tool equipment (7-31) *Revoked by P-18-a*	PD-6-Rev.	
P-18-a	Material for production of cutting tools (8-28) *Supersedes P-18.*	PD-81	F
P-19	Material for construction of defense projects (7-18)	PD-63, PD-63-a	F
P-19-a	Material for construction of defense projects (limited to the priorities critical list) (7-18)	PD-68, PD-68-a	F
P-19-b	Material for construction of certain defense projects (7-30)	PD-68, PD-68-a	F
P-19-c	Material for specified publicly financed defense houses		
P-19-d	Material for privately financed housing projects (9-9)		
P-19-e	Material for highway projects		F
P-20	Material for construction of specified locomotives (7-21)	PD-64, PD-64-a	F
P-21	Material for repair and rebuilding locomotives	PD-65, PD-65-a	F
P-22	Repairs (9-9) Amend (10-16).		K
P-23	Materials for mining machinery (7-29)	PD-117	
P-24	Material for experimental research work (8-5)	PD-74, PD-74-a	M
P-25	Material for light tanks		F
P-25-a	Parts, accessories and equipment for light tanks (8-11)		F
P-25-b	Light tanks, spare parts and hulls (8-11)		F
P-25-c	30 caliber and 37 mm. guns for light tanks (8-11)		F
P-25-d	Gasoline and diesel engines for light tanks (8-11)		F
P-25-e	Light tank parts (10-14)		F
P-26	Material for medium tanks		F
P-26-a	Parts, equipment for medium tanks (8-11)		F
P-26-b	Medium tanks, spare parts, hulls, etc. (8-11)		F
P-26-c	37 mm. and 75 mm. guns for medium tanks (8-11)		F
P-26-d	Gasoline and diesel engines for medium tanks (8-11)		F

Order Number	Material Covered	Related Form	How Extended
P-26-e	Medium tank parts (10-14)		F
P-29	Health supplies rating plan (8-25)	PD-79, PD-80	F
P-31	Materials for production of foundry equipment and repair parts (9-5)	PD-81	F
P-32	Parts for maintenance and repair of farm machinery (8-20)	PD-6, PD-88	F
P-33	Farm machinery and equipment (8-20)	PD-81	F
P-38	Material for production of radiosondes (8-26)	PD-89, PD-81	
P-39	Material for production of arc and resistance welding machines (9-12)	PD-81	F
P-40	Material for industrial lift trucks (10-14)		F
P-41	Construction, maintenance, operation of defense projects (8-27)		
P-42, P-42-a	Canning machinery and equipment (8-21 and 9-12)	PD-6	F
P-43	Research laboratory supplies (8-28)	PD-93, PD-88, PD-107	F
P-45	Material for fire-fighting apparatus (10-31)	PD-81	Q
P-46	Repairs, maintenance for utilities (9-17)	PD-118	
P-47	Maintenance, repairs of air transport facilities (9-6)	PD-96	F
P-51	Canning machinery, equipment (9-22)		
P-52	Aircraft accessories (9-15)	PD-81, PD-108	F
P-53	Textile machinery repairs (9-13)	PD-81	F
P-54	Specified types of trucks, passenger carriers, trailers (9-12)		J
P-55	Defense housing projects (9-12)	PD-105, PD-105-a, PD-105-b	
P-56	Repairs for mines. Revokes P-22 as provisions apply to mines	PD-119	L
P-57	Replacement parts for passenger cars, light trucks (9-18)		J
P-58	Supplies for specified South American mines (10-8)		M
P-61	Scrap for certain copper ingot makers, remelters (10-13)		
P-62	Material for laboratory equipment and reagent chemicals (11-15)	PD-93	F
P-68	Maintenance and repair supplies for steel industry (10-31)	PD-148	P
P-72	Material for elevator and escalator repair parts (11-10)	PD-81	O
P-75	Material for tackle blocks (10-24)		
P-76	Sheet steel for drums	PD-81, PD-156	R
P-77	Material for rebuilding of machine tools (11-10)	PD-81, PD-157	F
P-78	Material for conveying equipment (11-10)	PD-81, PD-82	N
P-79	Hardware for cooperage and wooden container industry	PD-81	F

"E" Orders

Order Number	Material Covered	Related Form	How Extended
E-1	Machine tools (3-28). Supplement No. 1 (7-7). *Revokes E-1.*		
E-2	Cutting tools (7-17). Amendment (7-25).		
E-2-a	Supplement (8-28). *Revokes E-2.*		

"L" Orders

Order Number	Material Covered	Related Form	How Extended
L-1	Restricts production of motor truck and public passenger carriers (8-30). Amended by L-1-a.	PD-95	
L-1-a	Restricts production of medium motor trucks, truck trailers, passenger carriers and replacement parts (9-12). *Amends L-1*		
L-2	Restricts production of passenger automobiles (9-13).		
L-2-a	Supplement (10-24).		
L-2-b	Restricts use of bright work on automobiles after Dec. 15 (10-27).		
L-2-c	Automobile output schedule for January, 1942 (11-7).		
L-3	Restricts production of light motor trucks (9-13).		
L-3-a	Supplement (10-24).		
L-3-b	Supplement (11-4).		
L-4	Restricts production of replacement parts used in repair of passenger automobiles and light trucks (9-19).		
L-4-a	January, 1942, production schedule for light trucks for civilian use (11-14).		
L-5	Restricts domestic mechanical refrigerator production (9-30).	PD-125	
L-6	Restricts production of ironers and washers (10-29).		
L-7	Restricts production of non-mechanical ice refrigerators (10-29).		
L-8	Restricts distribution of motor fuel in Atlantic Coast area. *Revoked Oct. 24.*		
L-11	Restricts use of chlorine in pulp, paper and paperboard making (11-15).		
L-13	Restricts production of metal office furniture, etc. (11-7).		
L-15	Restricts use of waste paper in Eastern mills (10-25).		
L-16	Restricts electric power use in Southeastern area (10-30).		
L-20	Restricts use of cellophane and similar materials derived from cellulose (11-8).		

"S" Orders

Order Number	Material Covered	Related Form	How Extended
S-1	Suspends certain operations of pattern and aluminum foundry in Chicago (10-16).		

Miscellaneous Orders

Priorities Regulation No. 1 (8-27).
Priorities Regulation No. 2 (9-9).
General Metals Order No. 1. [*Terminated September 23, 1941. Restrictions imposed covered by Priorities Regulation No. 1*].
Special Allocation No. 1—Directs certain machine tool builders to accept specified orders for Russia (11-11).

"M" Orders

Order Number	Material Covered	Related Form	How Extended
M-1	Aluminum (3-22)	PD-8, PD-23, PD-26, PD-39, PD-40	
M-1-a	Supplement—schedule of ratings (3-22).		

Order Number	Material Covered	Related Form No.
M-1-b	Supplement modifies M-1 and M-1-a with respect to low-grade deliveries (4-11). Extension—extends M-1, M-1-a, M-1-b to Dec. 31, 1941 (5-20). *Superseded by M-1-c.*	
M-1-c	Supplement — directs distribution of scrap and secondary aluminum (6-10).	PD-114
M-2	Magnesium (3-24).	PD-26-m, PD-40-m
M-2-a	Supplement (3-24). Extension—extends M-2 to Sept. 30, 1941 (4-2).	
M-2-b	Supplement — extends control over scrap, dead stock, etc. (11-14).	
M-3	Tungsten (3-26)	PD-9
M-3-a	Supplement (3-26). *M-3 and M-3-a revoked by M-29.*	
M-4	Neoprene (3-28). *M-4 expired June 30; included under provisions of M-13.*	PD-7, PD-36
M-5	Nickel-bearing steel (4-10).	PD-10, PD-11, PD-17, PD-18
M-5-a	Supplement (4-10). Amendments (4-30).	
M-5-b	Supplementary order (6-17). *M-5, M-5-a, M-5-b, revoked by M-21-a.*	
M-6	Nickel (5-15)	PD-27
M-6-a	Primary nickel (9-30). *Supersedes M-6.*	
M-7	Borax and boric acid (6-9). *M-7 expired August 30, 1941.*	PD-31
M-8	Cork (5-31)	PD-28, PD-51
M-8-a	Cork end products (10-1)	PD-29
M-9	Copper (5-29) Amendment (6-10). Amendment (7-9).	PD-37, PD-76
M-9-a	Supersedes M-9 (8-2).	PD-120, PD-121, PD-126, PD-130, PD-109
M-9-b	Copper scrap and copper base alloy scrap (10-1)	
M-9-c	Curtails use of copper in certain items (10-21). Amended (11-1).	PD-167
M-10	Polyvinyl chloride (6-9)	PD-7, PD-36
M-11	Zinc (7-1)	PD-50, PD-50-a, PD-62, PD-94
M-11-a	July pool (7-1)	
M-11-b	August pool (8-1).	
M-11-c	September pool (9-1).	
M-11-d	October pool (10-1).	
M-11-e	November pool (11-1).	
M-13	Synthetic rubber (includes Neoprene) (6-9)	PD-7, PD-33, PD-36
M-14	Tungsten high-speed steel (6-11).	PD-101
M-15	Rubber (6-20)	PD-49
M-15-a	Supplement (6-27).	
M-16	Tricresyl and triphenyl phosphates (8-30).	
M-17	Pig iron (8-1) Amendment (10-14).	PD-69, PD-70, PD-71
M-18	Chromium (9-7) Amendment (8-22).	PD-53-a, PD-53-b, PD-54, PD-55
M-19	Chlorine (7-26).	
M-20	Calcium-silicon (7-29)	PD-72
M-21	Steel (8-9) Amendment (9-9).	PD-73, PD-75, PD-99, PD-100
M-21-a	Supplement — relating to alloy iron, alloy steel and wrought iron (9-16).	
M-21-b	Supplement — relating to steel warehouses (9-3) Directive-assigns A-9 Rating to warehouse supplies (9-26). *M-5, M-5-a, M-5-b, revoked by M-21-a.*	PD-83-a, PD-83, PD-83-b, PD-83-d
M-23	Vanadium (8-14)	PD-84
M-24	Scrap iron and steel (10-11).	PD-149, PD-150, PD-151
M-25	Formaldehyde, paraformaldehyde, hexamethylenetetramine and synthetic resins (8-23). Amendment (8-28).	
M-27	Phenols (8-30).	
M-28	Chlorinated hydrocarbon refrigerants (8-22).	
M-29	Tungsten (8-31)	PD-9
M-29-a	Supplement (10-13).	
M 30	Ethyl alcohol (8-28).	
M-31	Methyl alcohol (8-28).	
M-32	Potassium perchlorate (8-28).	
M-33	Potassium permanganate (8-28).	
M-34	Toluene (8-28).	
M-35	Phosphorus oxychloride (8-30).	
M-36	Manila fiber and manila cordage (8-29).	
M-38	Lead (10-4)	PD-66-a, PD-124
M-38-a	Supplement (11-17).	
M-39	Cobalt (11-4).	PD-152, PD-153
M-41	Chlorinated solvents, including carbon tetrachloride, trichlorethylene, perchlorethylene and ethylene dichloride.	PD-127
M-45	Sheet steel inventory for drums	
M-46	Chlorinated rubber (10-29)	

OPA Price Ceilings Affecting the Metal Working Industry

(Numbers in brackets refer to date of issuance)

Price Schedule	Subject
No. 1	Second-hand machine tools (2-17) Amendment (3-15) — (4-9) — (9-24) Supplement 1 (5-7)
No. 2	Aluminum scrap and secondary ingot (3-24)
No. 3	Zinc scrap (3-31) Statement of policy (4-9) Amendment (10-17)
No. 4	Iron and steel scrap (4-3) Amendment (4-9)—(5-7)—(6-18) — (6-20) — (6-21) — (8-7) — (8-26)—(9-5)—(9-22)—(9-26)
*No. 5	Bituminous coal (4-2)
No. 6	Iron and steel products (4-16) Revised (6-20)
No. 8	Nickel scrap (5-29) Amendment (6-26) — (9-5) — (9-18)
No. 10	Pig iron (6-24)
No. 12	Brass mill scrap (7-21) Amendment (10-1)
No. 15	Copper (8-12) Amendment (8-28)
No. 17	Pig tin (8-14)
No. 18	Burlap (8-15)
No. 19	Southern pine lumber (8-16)
No. 20	Copper scrap (8-18) Amendment (10-10)
No. 21	Formaldehyde (8-20)
No. 22	Pennsylvania crude oil (8-22)
No. 26	Douglas fir lumber (9-11)
*No. 27	Anthracite coal (9-11)
No. 28	Ethyl alcohol (9-15)
No. 29	Coke (9-18)
No. 30	Waste paper (9-18)
No. 31	Acetic acid (9-24)
No. 32	Paperboard (9-30)
No. 34	Wood alcohol (10-3)
No. 36	Acetone (10-20)
No. 37	Normal butyl alcohol (10-20)
No. 38	Glycerine (10-27)
No. 40	Builders' hardware and insect cloth (11-14)
No. 41	Steel castings (11-14)

* Price schedule No. 5 revoked 5-1; No. 27 revoked 9-10.

Forms to Use With Priority Orders

Forms below are those in active use at time of going to press. Some forms, previously in use, but now obsolete, are not listed. See column "Related Forms," pages 3, 4 and 5.

Form No.	Description
*PD-1	Application for preference rating.
*PD-2	Civilian preference rating certificate.
PD-3	Army or Navy preference rating certificate.
PD-4	U. S. Government agency preference rating certificate, other than Army and Navy.
PD-5	Foreign government preference rating certificate.
*PD-6 Rev.	Tabulation of extension for preference ratings made pursuant to preference orders P-5-a, P-18 and P-32.
*PD-6-a	Alternate of Form PD-6.
PD-7	Monthly synthetic rubber requirements.
PD-8	Priority rating index of products requiring aluminum.
PD-9	Application for allocation of ferrotungsten, tungsten powder or tungsten compounds.
*PD-13	Tabulation of preference rated orders placed during a given month, pursuant to Order P-3.
*PD-14	Tabulation of preference rated orders placed during a given month, pursuant to Order P-4.
PD-20	Application for preference rating for copper or zinc from Metals Reserve Co. pool.
PD-23	Report to be filed by all customers requesting delivery of aluminum after a given date (withheld).
PD-24	Priorities Critical List.
PD-25	Report of requirements for scarce materials (first report).
PD-25-a	Report of requirements for scarce materials.
*PD-25-b	Report of extension of Defense Supply Rating Order (P-6).
*PD-25-c	Customer's certificate identifying order under Defense Supplies Rating Plan (P-6). Sent to supplier monthly.
*PD-25-d	Customer's certificate identifying order under Defense Supplies Rating Plan (P-6). Sent to supplier with each order.
PD-26-a	Aluminum monthly shipping schedule.
PD-26-m	Monthly magnesium shipping schedule.
PD-27	Detailed application for nickel required for melting in a given month, and statement of stocks and consumption.
PD-28	Affidavit of compliance with cork order.
PD-29 Rev.	Report of cork shipments and processing requirements pursuant to Order M-8.
*PD-30	Tabulation of preference rated orders placed for a given month, pursuant to Order P-7.
*PD-30-a	Alternate form to PD-30.
PD-33	Report of producer's stock, and production and orders, re: Order M-13.
PD-36	Consumption, allotment and receipts of synthetic rubber materials and plasticized resins, pursuant to Order M-13.
PD-37	Reports of production of duty-free refined copper.
*PD-38	Tabulation of preference rated orders placed during a given month, pursuant to Order P-8.
*PD-38-a	Alternate form to PD-38.
PD-39	Statement substantiating evidence of monthly aluminum delivery schedule given in PD-26.

Form No.	Description
PD-40-a	Report on inventory and consumption of aluminum.
PD-40-m	Report on magnesium inventory.
*PD-42	Tabulation of extensions of preference ratings made pursuant to Order P-11.
*PD-42-a	Certification of Form PD-42.
*PD-43	Tabulation of extensions of preference rated orders placed pursuant to Order P-9-a.
*PD-43-a	Certification of PD-43.
*PD-44	Tabulation of extensions of preference rated orders placed pursuant to Order P-9-b.
*PD-44-a	Certification of Form PD-44.
*PD-45	Report of preference rated orders placed pursuant to Order P-9-c.
*PD-45-a	Certification of Form PD-45.
*PD-46	Report of preference rated orders placed pursuant to Order P-9-d.
*PD-46-a	Certification of Form PD-46.
*PD-47	Report of preference rated orders placed pursuant to Order P-9-e.
*PD-47-a	Certification of Form PD-47.
*PD-48	Report of preference rated orders placed pursuant to Order P-9-f.
*PD-48-a	Certification of Form PD-48.
PD-49 Rev.	Report of crude rubber stocks and consumption, pursuant to Order M-15. Filed by processor.
PD-49-a Rev.	Report of crude rubber stocks, receipts and consumption, re: M-15. Filed by importers and dealers.
PD-50	Customer's affidavit concerning zinc.
PD-50-a	Producer's affidavit of compliance with preference order on zinc.
*PD-52	Report of preference rated orders placed pursuant to Order P-13.
*PD-52-a	Certification of Form PD-52.
PD-53-a	Application for chromium needed for melting.
PD-53-b	Report on chromium stocks, shipments and consumption.
PD-54-Rev.	Request for chromium chemicals.
PD-55	Request for chromite refractories.
*PD-56	Report of preference rated orders placed pursuant to Order P-14-a.
*PD-56-a	Certification of Form PD-56.
*PD-57	Report of preference rated orders placed pursuant to Order P-15.
*PD-57-a	Certification of Form PD-57.
*PD-58	Report of preference rated orders placed pursuant to Order P-16.
*PD-58-a	Certification of Form PD-58.
PD-59	Application for copper for domestic use.
PD-59-a	Application for copper for domestic use.
PD-60	Analysis of copper for domestic use.
PD-60-a	Analysis of copper for domestic use.
PD-61	Output and shipments of copper.
*PD-62	Application for allocation of zinc oxide.
*PD-63	Report of contracts or orders to which rating assigned by Order P-19 has been applied during a month.
*PD-63-a	Certification to accompany purchase orders furnished by the builder or supplier in connection with P-19.
*PD-64	Reports of contracts or orders to which rating assigned by Order P-20 has been applied during a month.
*PD-64-a	Certification to accompany purchase orders furnished by the builder in connection with P-20.

Form No.	Description
*PD-65	Report of contracts or orders to which rating assigned by Order P-21 has been applied during a month.
*PD-65-a	Certification to accompany purchase order furnished by the repairer or builder in connection with P-21.
PD-66-a	Application for allocation of lead, re: M-38.
*PD-68	Report of contracts or orders to which rating assigned by Order P-19-a has been applied during a month.
*PD-68-a	Certification to accompany purchase orders furnished by the builder or supplier in connection with P-19-a.
*PD-69	Customer's pig iron order for shipment.
PD-70	Customer's report of inventory and consumption of pig iron.
PD-71	Pig iron producer's shipping schedule.
PD-71-a	Authorization establishing pig iron emergency pool.
PD-71-b	OPM authorization to pig iron producer to make shipments.
PD-71-c	OPM allocation order to pig iron producer.
PD-72	Requirements of calcium silicon.
*PD-73	Customer's statement to producer classifying purchase order or contract for steel.
*PD-74	Report of orders to which rating assigned by Order P-24 has been applied.
*PD-74-a	Certification to accompany PD-74.
*PD-75	Request for alloy iron or steel.
PD-76	Copper allocation.
PD-79	Requirements of scarce materials in connection with Health Supplies Rating Plan (P-29).
PD-80	Report of re-extension of Health Supplies Rating Order.
*PD-81	Monthly report of rating assignments in connection with various P orders.
PD-81-a	Certification of Form PD-81.
PD-82	Application for limited preference rating order for materials for defense production.
PD-83	Statement of deliveries of steel warehouses.
PD-83-b	Steel preference rating certificate.
PD-83-c	Producers statement regarding consigned steel sales and stocks.
PD-83-d	Classification instructions for steel warehouse report PD-83-a.
PD-84	Monthly report of vanadium inventories and consumption.
PD-88	Application for preference rating, re: P-43.
*PD-93	Report of preference rated orders placed pursuant to P-43 and P-62.
PD-94	Monthly application for zinc allocations.
PD-95	Application for preference rating in connection with Order L-1.
PD-96	Application for preference rating for scarce materials needed for maintenance and repair of aircraft, in connection with Order P-47.
PD-97	Report of aluminum foil inventory and use in manufacture of fixed condensers.
PD-98	Monthly inventory and consumption report concerning aluminum foil.
PD-99	Steel capacity and rolling schedules for November; a producer's report.
PD-100	Same as PD-99 except that it is for use by producers with more than one plant.
PD-101	Quarterly report of high-speed steel orders and shipments, pursuant to Order M-14.
PD-105 PD-105-a PD-105-b	Application for preference rating in connection with privately financed defense housing projects, and documentation sheets pursuant to order P-55.
PD-107	Questionnaire for applicants for supplies and equipment in connection with Order P-43.
PD-108	Application for preference rating in connection with Order P-52.
PD-109	Report of foundry receipts, purchase and consumption of copper and copper alloy scrap between Sept. 30 and Nov. 1, pursuant to Order M-9-b.
PD-114	Application for authorization to enter into toll processing agreement for aluminum and magnesium.
PD-115	Application for preference rating, re: P-11.
PD-117	Report concerning mining machinery, P-23.
PD-118	Report of withdrawals, re: P-46.
*PD-119	Monthly report of purchases, supplies, maintenance items and repairs under Order P-56.
PD-120	Dealers' report on scrap metals.
PD-121	Monthly report of copper scrap consumer.
PD-123	Monthly requirements of copper and copper alloys.
*PD-124	Monthly delivery schedule of lead supplies, re: M-38.
PD-125	Monthly report of mechanical refrigerator makers, re: L-5.
PD-126	Dealers' application for listing as melters under copper scrap order.
*PD-127	Purchasers' certificate, re: M-41.
PD-130	Application by melters or processors for preference rating under copper scrap order.
*PD-131	Report of adjustments under L-8.
PD-133	Certificate of compliance with M-8.
PD-143	Report of chlorinated rubber needs of fabricators.
PD-144	Report of chlorinated rubber receipts, use and inventory, filed by fabricator.
*PD-148	Application for preference rating for iron and steel plant reports, re: P-68.
*PD-149	Monthly report of iron and steel scrap producer.
*PD-150	Monthly report of iron and steel scrap consumer.
*PD-151	Monthly report of iron and steel scrap broker or dealer.
PD-152	Report on cobalt, re: M-39.
PD-153	Report on cobalt, re: M-39.
PD-156	Application for rating for steel for drums, re: P-76.
PD-157	Report of rebuilt machine tools, re: P-77.
PD-158-b	Distributors' reports on chlorine sales.
PD-158-c	Users' report on chlorine consumption.
PD-159-a	Report on chlorine production.
PD-165	Request for name of supplier served a specified priority certificate.
PD-167	Hardship appeal under copper conservation order M-9-c.

*These forms may be reproduced, but no changes of any nature from the original text are permitted.

How to Extend Priority Orders to Suppliers

(Letters under column HOW EXTENDED in list of P Orders (page 3) refer to methods below)

Method A

Applies to PD-1 and PD-2

In effect, OPM at present has eliminated the PD-2 and is returning to the applicant the original PD-1 application form stamped with Mr. Nelson's facsimile signature. When thus returned, PD-1 to all intents and purposes becomes the same as PD-2 which used to be issued. Applicant then sends the approved and stamped PD-1 to his supplier. If the sub-contractor or supplier wishes to extend this certificate to his sub-contractor or supplier, the same procedure applies as existed when the PD-2 was used; that is, he reapplies on another PD-1 application form.

Method B

Applies to PD-3 and PD-4

Blank copies of these certificates should be obtained from the branch of the service or government originating the certificate, which should then be filled in and certified on the back in the space provided in the left hand side. This signed set should then be taken or sent to the nearest branch of the service or government originating the certificate for certification by the procurement officer, inspector or authenticating officer. When taking or sending such certificate for authentication, the original certificate received should be taken or sent also in order that the procurement officer may identify to his satisfaction the extension which he is being asked to authenticate.

Method C

Applies to PD-5

PD-5 is extended in the same way as PD-3 and PD-4 except that there is required on the back an additiona. counter-signature of the government official representing the various governments from which the original PD-5 was issued.

Method D

On one of the blank copies, execute the acknowledgment ("the undersigned acknowledges receipt of . . .") and send this to the Priorities Division, OPM, Washington. Do not execute the certification. On another blank copy, execute the certification (leaving the acknowledgment blank) and forward this together with your order to the sub-contractor or supplier. Such executed copy is the extension.

Method E

Execute and have notarized the acknowledgment and forward one copy to the Priorities Division, OPM, Washington. On another copy execute the acknowledgment and forward with the order to sub-contractor or supplier.

*P-12 can be extended only to the person from whom the smelter purchases the scrap. Follow instructions for Method E except that it is applicable only to the supplier. The acceptance must be notarized.

Method F

Execute the acknowledgment and forward one copy to the Priorities Division, OPM, Washington. On another copy execute the acknowledgment and forward with the order to sub-contractor or supplier. (Same as Method E except that no notarization is needed.)

Method G

Execute the acknowledgment and forward one copy to the Priorities Division, OPM, Washington. Execute the certification on another copy and have the certification also authenticated by the officer or inspector located at the plant of the issuing "producer."

Method H

Execute the acceptance and send to the Priorities Division, OPM, Washington. Execute the affidavit, filling in lines 15 and 16 with the name of the customer who sent the order to you.

Method I

Insert in the space provided, classification of the "producer." Execute in the spaces provided and send one copy to the Power Branch, OPM, Washington. Do the same with another copy except that this copy should be retained for file. In order to extend this rating from "producer" to supplier or from supplier to sub-supplier, such "producer" or supplier must endorse the following statement on the original and all copies of each purchase order or contract for materials, the delivery of which is entitled to the preference rating: "Purchase order for Utilities Operation, Maintenance and Repair, Preference Rating A-10, pursuant to Preference Rating Order No. P-46" (Authorized Signature) and deliver the original or copy to the seller of such material.

Method J

Order for material is endorsed by producer and supplier as follows: "An (A-3; A-10) preference rating is assigned to this purchase order pursuant to Limited Preference Rating Order No. (P-54; P-57). This application of rating is made by the (supplier; producer) upon the conditions set forth on said order, with which we are familiar.

—(Authorized signature of producer or supplier)."

Note: P-54 assigns A-3 rating; P-57 assigns A-10 rating.

Method K

A producer or supplier in order to apply the preference rating to deliveries of material to h[illegible]n, must endorse the following statement on th[illegible]riginal [illegible]d all copies of the purchase order or contra[illegible]r su[illegible]h material manually signed by a responsible [illegible]designated for such purpose by the producer[illegible]'Material for maintenance, repair or operat[illegible]Rating A-10 u[illegible]der Preference Rating Orde[illegible]mended, with the terms of which I am fa[illegible]orized signatu[illegible])."

M[illegible]

In order to apply the [illegible]ng, send [illegible]statem[illegible]nt to the OPM at Washington [illegible]bing the n[illegible]erial and the nature of the emergency [illegible]M will cer[illegible] the ap[illegible]lica-tion, which is to be passe[illegible] to the sup[illegible].

To extend the A-8 pric[illegible] endorse as [illegible]lows: "Purchase order for material [illegible] a mine rati[illegible] pursuant to Preference Rating Order P-56 Mine Serial No. ....., Rating A-8. This application is made pursuant to the terms and conditions of that order with which the undersigned is familiar. —Authorized Signature."

Method M

The preference rating may be assigned by the operator and the supplier, by endorsing the following statement, with the applicable preference rating stated, on the original purchase order or contract and all copies thereof: "An A- (fill in applicable rating) preference order is assigned to this purchase order pursuant to Limited Preference Rating Order P-58. This application of the rating is made by the (Operator; Supplier) upon the conditions set forth in said order with which the undersigned is familiar. (Authorized signature of operator; supplier.)"

Method N

Execute the acceptance at the end of the order; detach and send to Industrial & Office Machinery Branch, Division of Civilian Supply, OPM, Washington; furnish one copy of the order with an unsigned form of acceptance to the supplier. Producer or supplier shall identify all purchase orders which are covered with the rating by endorsing the following statement thereon: "Material for defense products—Preference Rating (fill in) Under preference rating order P-78, Serial No. (fill in) with the terms of which I am familiar. (Authorized signature.)"

Method O

Same as Method N except that statement endorsed on purchase orders reads: "Purchase order for material for elevator and escalator repair parts, preference rating A-3, pursuant to Preference rating order No. P-72."

Method P

After approval of application by OPM, copy of the notification is furnished by producer to supplier. Producer or supplier endorses following statement on original and all copies of purchase order: "Material for repair, maintenance or operating supplies of an Iron, Steel, Blast Furnace, Coke, or Ferroalloys plant, Rating A- (fill in); under Preference Rating Order P-68; Serial No. (fill in) and in compliance therewith. (Authorized signature.)"

Method Q

Execute acceptance, detach and send to Fire Equipment Section, Division of Purchases, OPM. Furnish one copy of the order, with unsigned acceptance, to each supplier. Producer or supplier endorses following statement on material orders: "Preference Rating A-2. Purchase order for material to be physically incorporated into Fire Apparatus as defined in Preference Rating Order No. P-45, Serial No. (fill in) with which I am familiar. (Authorized signature.)"

Method R

Execute acceptance, detach and send to OPM at Washington. Furnish copy of the order to supplier. Endorse following statement on all copies of each purchase for material: "Purchase order for container steel, preference rating A-4, pursuant to Preference Rating Order P-76, not extendable."

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IMPORTANT: Each Preference Rating Order contains full instructions for applying the rating to delivery of material, and the order should be consulted whenever questions arise.

Ratings Given Defense Items

(Preference Ratings as of Nov. 22, 1941, Assigned by Various OPM Orders)

Important: Ratings are granted by the Army and Navy for material it requires on the Priorities Critical List, while the Priorities Division of the OPM issues ratings for all civilian projects and items, both military and civilian, which are not on the Critical List. The rating granted is governed by the urgency of the need for the item. Thus, material for guns for lighting [illegible] rated a rating of A-1-f, while material for [illegible] is rated A-3, indicating guns are more needed than freight cars. The sequence is A-1, A-1-a, A-1-b, etc., A-2, A-2-c, A-3, A-3-a, etc. Important civilian projects usually assigned B ratings

Description	Preference Order No.	Rating Assigned
Aircraft		
Material for airframes	P-3	A-1-d
Material for engines and propellers	P-4	A-1-c
Civil, repair parts and accessories	P-6-a	A-10
Material for heavy bomber airframes	P-9-a	A-1-b
Engines for heavy bombers	P-9-b	A-1-b
Propellers for heavy bombers	P-9-c	A-1-b
Gun turrets for heavy bombers	P-9-d	A-1-b
Gun sights, bombsights and gunfire controls for heavy bombers	P-9-e	A-1-b
Material for airframes	P-13	A-1-b
Transportation facilities, material for maintenance and repairs	P-47	A-3
Aluminum scrap	P-12	A-10
Automobiles, passenger, and light trucks, material for replacement parts	P-57	A-10
Canning machinery and equipment, material for production	P-42	A-3
	P-42A	A-7
	P-51	A-3
Conveyor machinery	P-78	A-3
Copper		
South American mines, material for maintenance and operation	P-58	A-3
Scrap and copper base alloys	P-61	A-10
Cranes and hoisting equipment, material for production	P-5-b	A-10 or higher
Cutting tools, material for production	P-18-a	A-1-a
Defense projects		
Material for construction	P-19	As assigned
Material limited to the Priorities Critical List	P-19-a	As assigned
Projects with protected delivery dates	P-19-b	As assigned
Material for construction, maintenance and operation	P-41	A-1-a
Defense supplies rating plan	P-6	A-10
Drums, sheet steel for construction of	P-76	A-4
Electrical relays and solenoid assemblies, material	P-15	A-1-d
Elevator and escalator repair parts	P-72	A-3
Farm Machinery and Equipment		
Maintenance and repairs	P-32	A-1-b
Material for construction	P-33	B-1
Fire apparatus, material for production	P-45	A-2
Foundry equipment and repair parts	P-31	A-1-b
Freight cars construction, material	P-8	A-3
Health supplies rating plan	P-29	A-10
Housing, defense, construction material		
Privately financed	P-19-d	as assigned
Publicly financed	P-19-c	as assigned
Material	P-55	as assigned
Iron and steel plants, maintenance, repair and supplies	P-68	A-3
Laboratory equipment and reagent chemicals, material for production	P-62	A-5
Lift trucks, industrial, material for production	P-40	A-1-g
Locomotives		
Steam, electric or diesel, material for repair and rebuilding	P-21	A-3
Specified, material for construction	P-20	A-3
Machine tools, material for rebuilding	P-77	A-1-c
Metal working equipment, material for production	P-11-a	as assigned
Mines		
Machinery and equipment	P-23	A-3
Maintenance, repairs and supplies	P-56	A-1-a A-8
Radio receiving, transmitting and directional equipment	P-16	A-1-c
Radiosondes, material for production	P-38	A-1-d
Repairs, maintenance and supplies	P-22	A-10
Research		
Experimental work, material for production	P-24	A-1-b
Laboratories, supplies and equipment	P-43	A-2
Road projects, material for construction	P-19-e	As assigned
Ships		
Merchant, material for construction	P-7	A-1-a (1941) A-1-b (1942) A-1-c (1943)
Conversion, material	P-10	AA
Ways, construction and equipment	P-14-a	A-1-a 1941
	P-14-b	A-1-b 1942 1943
Tackle blocks, material for production	P-75	A-1-c
Tanks, light type		
Parts, accessories and equipment	P-25-a	A-1-f
Spare parts and accessories	P-25-b	A-1-f
30 cal. and 37 mm. guns	P-25-c	A-1-f
Gasoline and diesel engines	P-25-d	A-1-f
Material for production	P-25-e	A-1-f
Tanks, medium type		
Parts, accessories and equipment	P-26-a	A-1-d
Spare parts and accessories	P-26-b	A-1-d
37 mm. and 75 mm. guns	P-26-c	A-1-d
Gasoline and diesel engines	P-26-d	A-1-d
Material for production	P-26-e	A-1-d
Textile machinery and equipment, parts for maintenance and repair	P-53	A-10
Trucks, truck trailers, and passenger carriers, material for production	P-54	A-3
Utilities, maintenance, repair and supplies	P-46	A-10
Welding machines, arc and resistance, material for production	P-39	A-1-c
Wooden container and cooperage industry, hardware items	P-79	A-5 A-8

Deadlines on Principal Monthly Reports to OPM on Metals

●● Listed below are principal reports being required by OPM from various metal fields on regular schedules. One-time and occasional reports have not been included. Some companies using numerous types of metals are required to file reports from a majority of the groups listed below. For example, a steel company in the East in addition to the reports listed under "Steel" below, files monthly consumer reports on aluminum, calcium-silicon, chromium, cobalt, copper, lead, nickel, pig iron, tungsten and vanadium. As suppliers, metal producers may file some of the reports listed in Section II below, when extension was necessary. A machine tool producer may file consumer reports on pig iron, aluminum and other metals in addition to such forms as PD-1, PD-81, PD-73, PD-25-c and E-2-a. Monthly reports of one Middle West machine tool producer weighed 27 lbs. when sent in last month.

Most orders specify that all persons affected by the order shall keep and preserve for a period of not less than two years (and in some cases five years) accurate and complete records of inventories, details of all transactions, contracts, purchases, etc.; names of all parties involved in transactions; accurate record of preference ratings; and all other pertinent information. Most scrap metals must be reported upon. PD-149 is the new monthly report due by the 20th from producers of over 50 tons of iron or steel scrap per month and PD-150 is the consumers' report. Brokers and dealers must file PD-151.

SECTION I

METAL	FORM NO.	WHO FILES IT	WHEN IT IS FILED	NEXT REPORT	SUBJECT OF REPORT	WHERE IT IS SENT
ALUMINUM	PD-40-a	Purchaser	Quarterly—next report to cover Dec. 30	Jan. 5	Inventory at end of preceding month and consumption analysis (notaried)	Aluminum and Magnesium Branch, OPM Priorities Division, Washington
	PD-26-a	Producers, Fabricators and Secondary Smelters	Monthly—due on 20th of month preceding month covered by report.	Dec. 20	Quadruplicate form giving contemplated shipping schedule (notaried)	F. B. Cliffe, Aluminum and Magnesium Branch, OPM, Washington
	.....	Producer	Monthly		Report on actual shipments	
CALCIUM-SILICON	PD-72	Purchaser	Monthly—by 25th	Dec. 25	Requirements for succeeding month and report on stocks (notaried)	Priorities Division, OPM, Washington
CHROMIUM	PD-53-a	Purchaser	Monthly—by 25th	Dec. 25	Detailed application covering requirements in next month, showing per cent of above for each customer	Director of Priorities, OPM, Washington, (2 copies)
	PD-53-b	Consumer	Monthly—by 25th	Dec. 25	Report on consumption, stocks, etc., in preceding month (notaried)	Director of Priorities, OPM, Washington (Original and one copy to Washington, copy to supplier)
COBALT	PD-152	Consumer	Monthly—by 20th	Dec. 20	Requirements for month	OPM Priorities, Washington
	PD-153	Consumer	Monthly—by 20th	Dec. 20	Report on stocks, etc.	OPM Priorities, Washington
COPPER	PD-59-a	Fabricator	Monthly—by 20th	Dec. 20	Application in triplicate for next month's supply for domestic consumption	OPM Copper Commodity Branch, Washington
	PD-60-b	Fabricator	Monthly—by 20th	Dec. 20	Triplicate report on requirements for various classifications	OPM Copper Commodity Branch, Washington
	PD-61	Refiner	Monthly		Output and shipments of duty free copper	OPM Copper Commodity Branch, Washington
LEAD	PD-66-a	Consumer	Monthly –by 15th	Dec. 15	Application for allocation in next month, giving inventory, etc.	OPM Lead Commodity Branch, Washington
	PD-124	Producer	Monthly—by 20th	Dec. 20	Schedule of proposed shipments in next month, customer's names, etc.	OPM Lead Commodity Branch, Washington
NICKEL	PD-27	Purchaser	Monthly—by 20th	Dec. 20	Report of requirements in next month, stocks, with customer's names. (Notaried)	OPM Priorities, Washington (Copy of Sched. II to supplier)
MAGNESIUM		Owner of Dead Stock	Monthly—last day of month	Nov. 31	Amount and kind of all dead stock	Aluminum and Magnesium Branch, OPM, Washington
	PD-26-m	Producer, Fab-	Monthly—by 20th	Dec. 20	Shipping schedule	Aluminum and Magnesium Branch, OPM, Washington
	PD-70	Customer	Monthly—by 15th	Dec. 15	notaried)	
	PD-71	Producer	Monthly—by 15th	Dec. 15	Report of inventory and consumption. Notaried	Iron and Steel Branch OPM, Washington
STEEL	PD-83	Warehouse	Monthly—by 15th	Dec. 15	Shipping schedule for following month. Quadruplicate	Iron and Steel Branch, OPM, Washington

NICKEL	PD-27	Purchaser			customer's names. (Notaried)	
MAGNESIUM		Owner of Dead Stock	Monthly—last day of month	Nov. 31	Amount and kind of all dead stock	Aluminum and Magnesium Branch, OPM, Washington
	PD-28-m	Producer, Fab-	Monthly—by 20th	Dec. 20	Shipping schedule	Aluminum and Magnesium Branch, OPM, Washington
	PD-70	Customer	Monthly—by 15th	Dec. 15	notaried) Report of inventory and consumption. Notaried	Iron and Steel Branch OPM, Washington
	PD-71	Producer	Monthly—by 15th	Dec. 15	Shipping schedule for following month. Quadruplicate	Iron and Steel Branch, OPM, Washington
STEEL	PD-83	Warehouse	Monthly—by 15th	Dec. 15	Report of shipments in preceding month, receipts and inventory	Iron and Steel Branch, OPM, Washington
	PD-99	Producer	Monthly—by 6th	Dec. 6	Scheduled production and proposed distribution	Iron and Steel Branch, OPM, Washington
	PD-73	Warehouse	Monthly—by 5th	Dec. 5	Report of all orders placed with producer in previous month	To Producer
	PD-100	Producer	Monthly—by 6th	Dec. 6	Capacity, allocation and rolling schedule	Iron and steel Branch, OPM, Washington
	PD-101	Producer	Quarterly		High speed steel orders and shipments made	Iron and Steel Branch, OPM, Washington
	AIS-16	Producer	Monthly—by 25th	Dec. 25	Report of shipments by consuming industries	Copy to OPM and copy to A.I. & S.I.
	AIS-17	Producer	Monthly—by 15th	Dec. 15	Shipments and unfilled tonnage reports	Copy to OPM and copy to A.I. & S.I.
	AIS-17-a	Producer	Monthly—by 15th	Dec. 15	Shipments and unfilled tonnage reports	Copy to OPM and copy to A.I. & S.I.
TUNGSTEN	PD-9	Purchaser	Monthly—by 10th	Dec. 10	Request for allocation in following month and report on stocks	OPM Priorities, Washington
VANADIUM	PD-84	Purchaser	Monthly—before 25th	Dec. 25	Inventories for current month, and consumption in preceding month, probable consumption in following month	OPM Priorities, Washington
ZINC	PD-50-a	Producer	Monthly—by 10th	Dec. 10	Statement of compliance and list of orders lacking PD-50 during preceding month	Copper-Zinc Branch, OPM, Washington
	PD-94	Customer	Monthly—by 10th	Dec. 10	Application for allocation in following month; report of consumption in preceding month; inventory for current month	Copper-Zinc Branch, OPM, Washington

SECTION II

Monthly reports by producers and suppliers showing tabulation of preference rated orders extended in the previous month are due as follows:

Monthly, by the 15th (Next report due Dec. 15)

Aircraft Maintenance PD-81 (or PD-81-a)
Airframes, heavy bomber PD-43 (or PD-43-a)
Airplane Engines and Props PD-14
Auto and truck parts
Cranes PD-81(PD-81-a)
Cutting Tools PD-6 (or PD-6-a)
Defense Supplies PD-25-c
Engines, heavy bomber PD-44 (PD-44-a)
Farm Machinery Repair PD-81 (PD-81-a)
Freight Cars PD-38 (PD-38-a)
Gun Turrets, bomber PD-46 (PD-46-a)
Gunsights, etc., bomber PD-47 (PD-47-a)
Locomotive Repair PD-64 (PD-64-a)
Locomotive Making PD-65 (PD-65-a)
Machine Tools PD-81 (PD-81-a)
Propellers, bomber PD-45 (PD-45-a)
Radio Equipment PD-58 (PD-58-a)
Relays and Solenoids PD-67 (PD-67-a)
Welding Equipment PD-81 (PD-81-a)

Monthly, by the 5th (Next report due Dec. 5)

Motor Trucks

Monthly, by the 10th (Next report due Dec. 10)

Airframes PD-13
Mines PD-119
Shipbuilders PD-30 (PD-30-a)
Tanks, light PD-81 (PD-81-a)
Tanks, medium PD-81 (PD-81-a)

Monthly, by the 20th (Next report due Dec. 20)

Laboratories PD-93

Monthly, by the 25th (Next report due Dec. 25)

Shipyards PD-56 (PD-56-a)

Where to go in Washington for Priorities Information

Members of the Priorities Specialists Staff of OPM, capable of rendering assistance on specific commodity problems, are listed below with their room numbers

Priorities Specialists Staff, OPM, New Social Security Building

Telephone Republic 7500

Samuel S. Stratton, technical consultant to director—Room 5714
S. Birss, assistant to director—Room 5714
P. B. Hoppin, assistant to director—Room 5714

Division of Production

Specialist	*Commodity*	*Room No.*
W. G. W. Glos	Head priority specialist	4309
C. Clay Crawford	Aircraft	4421
Walter C. Armstrong	Ordnance	4309
Allen B. Hood	Tanks and combat vehicles	1044
L. K. Vry	Tools	3340
W. C. Wetherill	Shipbuilding	4718
W. C. Wetherill	Construction	4718

Division of Purchases

J. Wilton Peters	Head priority specialist	2066
Charles Smith	Food supply	2627
Walter P. McGowan	Textile, clothing and equipage	2062
Samuel A. Palmer		2064
George G. Orrick		2079
Raymond G. Daly		2062
J. Bedford French	Health supplies and fire equipment	2605
Joseph H. DeVeau	Containers	2060
Charles Dailey		2727
L. Malcolm Slaght	Special assignments	2058
Thomas F. Flaherty		2431
Robert A. Harris		2064

Division of Civilian Supply

John W. Harriman	Head priority specialist	2204*
J. L. Ritchie	Pulp and paper	4036
Francis E. Merrill	Printing and publishing	4036
C. Henri Rush	Lumber and building materials	2238*
Philip B. Hoppin	Plumbing and heating	5714
John J. Moore, Jr.	Electrical appliances and consumers' durable goods	2300*
Fred Lavis, Jr.	Automotive transportation and farm equipment	2748
Austin Cunningham	Industrial and office machinery	2305*
Edward L. Rinkenbach, Jr.		2305*
Robert T. Williams	Rubber, rubber products	3360
Rex M. Beach	State, local government	2133*

Division of Materials

H. K. McCook	Head priority specialist	3359
E. S. Ferguson	Aluminum, magnesium	3305
D. P. Morgan	Chemicals	4062
Lucien Barnes		4062
E. Barrett Mason	Iron and steel	2412
James G. Bowen		2412
W. J. Zepp	Power	2750
Francis W. Fitzpatric		2742
Gaston F. Balme		2750
Fred L. Herron	Cork and asbestos	3360
Stephen P. Dorsey	Nickel	3330
George H. Roll	Tungsten	5194
Paul T. Brady	Copper, zinc	3359
George H. Roll	Manganese, chrome	5194
George H. Roll	Tin, lead	5194
George H. Roll	Mica, graphite	5194
George H. Roll	Miscellaneous minerals	5194

Office of Petroleum Coordinator
(New Interior Building)

James E. Hughes	Head priority specialist	7514
Robert K. Lyle	Petroleum	7514

Division of Export Control
(2501 "Q" Street, N. W.)

Stephen P. Dorsey		120, 2501

*Located in Temporary Building D, Independence Avenue and Fourth Street, S. W.

Field Offices of OPM Division of Priorities

These offices are organized to assist industry answer problems arising from the application of the priorities system. All field offices are under the supervision of L. J. Martin, assistant deputy director, Priorities Field Service, Washington. Listed below are the addresses of all offices opened to date and the names of the office managers.

ATLANTA, GA.
Federal Reserve Bank Bldg., John B. Reeves

BALTIMORE
Baltimore Trust Bldg., T. M. Chandles.

BOSTON
30 Peach St., W. P. Homans.

BUFFALO
M & T Bank Bldg., Paul R. Smith.

CHARLOTTE, N. C.
Liberty Life Bldg., J. E. MacDougell.

CHICAGO
230 South LaSalle St., W. G. Bailey.

CINCINNATI
Union Trust Bldg., Bruce W. Burroughs.

CLEVELAND
Federal Reserve Bldg., W. T. Walker.

DALLAS, TEXAS
Wood & Akard Streets, J. B. Crockett.

DAYTON, OHIO
32 North Main St., H. B. Doty

DENVER
U. S. National Bank Bldg., Virgil L. Board.

DETROIT
7310 Woodward Ave., Walter Hall

HARTFORD, CONN.
805 Main St., E. L. Howard

HELENA, MONT.
Federal Reserve Bank Bldg., Oscar A. Baarson.

HOUSTON, TEXAS
Federal Reserve Bldg., George L. Noble, Jr.

INDIANAPOLIS, IND.
Circle Tower Bldg., Albert O. Evans.

JACKSONVILLE, FLA.
Hildebrandt Bldg., G. H. Andrews.

KANSAS CITY, MO.
Federal Reserve Bank Bldg., Clifford Carr.

KNOXVILLE, TENN.
(Address not announced), Dyer Butterfield.

LOUISVILLE, KY.
Todd Bldg., 4th & Market St., James T. Howington.

LOS ANGELES
1151 South Broadway, G. Howard Hutchins.

MEMPHIS, TENN.
Sterrick Bldg., J. S. Bronson.

MILWAUKEE
First Wisconsin National Bank Bldg., F. J. Tharinger

MINNEAPOLIS
Rand Tower Bldg., Willard F. Kiesner.

NASHVILLE, TENN.
1015 Stohlman Bldg., George S. Gillen.

NEW ORLEANS
(Address not announced), John A. Bechtold.

NEW YORK
25 Broad Street; John B. Pollock.

OKLAHOMA CITY, OKLA.
Federal Reserve Bank Bldg., C. F. Aurand.

PHILADELPHIA
925 Chestnut Street; F. W. Slack.

PITTSBURGH
Grant Street & Ogle Way; C. F. Cruciger.

PORTLAND, ORE.
Bedell Bldg., J. Fred Bergesch.

RICHMOND, VA.
Federal Reserve Bank Bldg., Fred P. Wilmer.

SALT LAKE CITY
Utah Oil Bldg., Ralph E. Bristol.

SAN ANTONIO, TEXAS
415 W. French Place, Carl L. Pool.

SAN FRANCISCO
Federal Reserve Bank Bldg., Andrew L. Kerr.

SEATTLE
960 Stuart Bldg., W. D. Shannon.

ST. LOUIS
411 Locust Street, Louis E. Crandall.

TULSA, OKLA.
(Address not announced), A. E. Ballin